

Press Release

The African Drought  
Causes and Cures

(Paulos Gregorios)

I asked several knowledgeable people quite seriously : "Why such a severe African drought ? What are the causes ?".

Nearly everyone I asked, smiled and was silent for a while. Kurt Janssen, the UN Assistant Secretary General in charge of Emergency Operations in Ethiopia also smiled first, and then suggested that I put the question to the Ministry of agriculture in Ethiopia.

Dr. K.N.N.S. Nair, an Indian expert who works as an F.A.O. related consultant to the Land use planning department of the Ministry of Agriculture also smiled, but then became more explicit- too explicit for me to comprehend the whole thing. He later gave me two of his study papers - each running to several hundreds of pages.

"There is no general consensus", Dr Nair said, "but there are many hypotheses".

Nair's own hypothesis focuses on land use - over grazing, methods of cultivation and soil erosion resulting from the two.

Others would blame de-forestation as the main culprit.

Dr Alan Hecht, Director of the National Climate Programme says it is a global phenomenon; the causes cannot be located in Africa alone.

### The El Nino

Strange and far-fetched as it may seem Peruvian fishermen in South America have for at least a hundred years observed another phenomenon closely connected with the African drought- the El Nino.

The El Nino is a periodic phenomenon, though irregular and unpredictable. What is observed is a sudden and periodic spurt upwards in the surface temperature of certain regions of the Pacific Ocean. This causes have among the migration patterns of fish. The Peruvian fishermen have observed and recorded this phenomenon for the past 100 years. What is also observed, within the limits of the paucity of statistics, is even more weird. Twentythree times in the last 100 years, everytime the El Nino is observed in the Pacific (Peruvian) waters, it is followed, usually about five months later by a drought in Africa.

Scientifically speaking, the causal connection between the El Nino in Pacific and the drought in Africa remains unclear. But the conclation has now been scientifically observed. The causes for El Nino are themselves obscure, and the search for hidden or unknown currents is on. The tilt of the planet earth in relation to the Sun causes different parts

of the earth coming closer to the Sun at different times of the year. But this alone does not sufficiently account for El Nino. Nor can we find the correlation between the heat in the Pacific ocean, and the dryness on the African continent months later. The only Scientific conclusion we can draw from the observation of the correlation is that we can use the El Nino as an early warning system (up to 5 months ahead) for African drought. In fact there is such an early warning system built up by the new Ethiopian socialist government, based not only as the El Nino, but on other factors.

But this area of proper meteorological study based in all African countries should be a high priority for the F.A.O. and the World Food Council.

#### De-Forestation

The Ethiopian Government puts its stress on de-forestation as the main cause and therefore on re-forestation as the main cure. President (Liqá-Manber) Mangestn Hailemariam of Ethiopia put the highest emphasis on this programme in his historic address in May 1984 on the occasion of the tenth Anniversary of the Ethiopian Socialist Revolution. The Ethiopian government brochure on the drought claims that the denudation of the Ethiopian forests has been so intense that only 4% of the Ethiopian forests of 50 years ago exist today. This is surely an exaggeration since no adequate statistics exist on what the forests in Ethiopia were 50 years ago.

But everywhere in Africa there has been de-nudation of forests on a scale that defies the imagination. Since forests were not controlled by government, as population pressures increased, forests were cleared for new settlements; timber was used for construction of new houses, firewood and furniture. There has been little control, and greedy profiteers have mindlessly ravaged forest lands everywhere in Africa.

Ethiopia has a huge reforestation and afforestation program that is waiting to be funded. Other African countries have the same problem- projects for reforestation formulated but not funded. The reluctance of western governments to fund these projects is partly understandable. There is a general impression that African governments are corrupt and inefficient, and that money given would be more to enrich Ministers and their friends than to plant trees.

This is one complaint which is not applicable to the Ethiopian Ministers of Government. They are now required to maintain high principles of austerity and simplicity and a minister found to be misappropriating public funds would be immediately fired and summarily dealt with by the socialist regime.

#### Farming Methods

The present writer known Ethiopia fairly well and has recently visited the drought stricken areas of that country. Agriculture accounts for 46% of the Gross Domestic Product

in Ethiopia and constitutes 90% of its foreign trade (coffee, hides and skins). 85% of the working people are engaged in agriculture.

Since 1980 weather has been unfavourable in Ethiopia, and the growth rate in agricultural production has not been able even to keep up with the population growth.

The socialist government tried state farming, first about 73,000 hectares of cultivation, and then raising it to 300,000 hectares. The hope was that State farms would achieve a higher production rate than private farms run by peasants.

Absentee farming, the mainstay of the feudal system, has been abolished. The land is in the hands of the tillers, since 1974. The socialist state tried to introduce co-operative farming among the peasants, but with very limited success.

The idea was state farming, with better agricultural technology, would dramatically raise production and that the peasants would naturally emulate these models. Unfortunately, due to weather reverses and other factors, the State farms, instead of reaching the target of 25 quintals of wheat per hectare, achieved only about 14 quintals average - very near the average of the peasants' production by traditional methods.

Since most of the cultivated area in Ethiopia is slopes of hills, in the absence of adequate terracing, the erosion rate is unusually high. What Ethiopia needs on a priority basis, is terracing. The government has realized this and has large voluntary labour programmes for terracing hill-slopes.

Equally problematic is water use - ground water and irrigation. Too heavy dependence on rain and ground water has proved disastrous under drought conditions. The hydro-electric potential of the country is enormous - at least 56 million kilowatt hours a year, but only about 1.2 million had been tapped by 1983.

Funding remains main problem. But micro-hydel projects, for irrigation and local power supply can be a feasible proposition, only if the rains do not fail radically. I was deeply distressed, on a visit to the Blue Nil Falls, which in the past was a magnificent sight - a water-fall a several thousand meters width, to observe that it has now been reduced three small trickles. So the present government does not put too much stock into hydel projects.

They prefer the small diesel pump  $\sim 2$  hp to 5 hp. for the peasant to tap his own ground water. Unfortunately, however, during the drought, the ground water level also goes down and the boreholes may run dry. And pump maintenance is still difficult for the peasant.

## Over- Grazing

According to Dr. Nair, cattle-grazing is the main problem. Ethiopia is a country where 4 times (Nair says 5 times) as much land is used for cattle grazing as for agriculture. There are some 40 million cattle - cows, sheep and goats - in Ethiopia. Wealth was traditionally assessed in terms of the number of head of cattle possessed by a family. So there was large accumulation of cattle and consequently over-grazing.

Ethiopia has the largest cattle population in Africa, and the farming system is too heavily dependent on oxen. One-sixth of the arable land is cultivated for growing human food crops only because, according to Nair, five times as much land is utilized to support the necessary oxen. This again sounded rather exaggerated to the present writer. The grazing land also produces food in the form of meat. This argument was not acceptable, however, to Dr. Nair. His position was that the meat-eating Christians and Muslims of Ethiopia ate less meat per capita than the largely vegetarian Indian people did.

In any case, over-garzing is a major factor contributing to soil erosion in the African hill-lands. One way of reducing over-grazing is to produce other cattle-feed which can be administered without pastoral grazing. At the moment this remains a dream, but in long terms there seems to be no other

solution but to reduce the grazing burden on the land, through developing ways of producing cattle feed on some of the present grazing lands.

### Learning from Indian Experience

India has certainly the most impressive record in food production in a developing country. The Ethiopians and other Africans are anxious to learn from the Indian experience. They recognize, however, that the conditions and the culture are quite different. Nevertheless wider experience sharing between African countries and India is desirable. This is particularly so where African governments are capable of making use of the Indian experience and of influencing the people's farming methods.



# Carl Sagan: A Planetary Perspective

## Summary

A quarter century of planetary exploration has revealed dozens of enormously varied objects-- and life on none of them. Life on earth is rare and precious. No social convention, no political system, no economic hypothesis, no religious dogma is more important than preserving and enhancing life on earth for the very simple reason that if we destroy ourselves there will be no more social conventions, political systems, economic hypotheses or religious dogmas.

The kinds of malefactions we are perfecting today go back 10,000 years or more. In our stewardship of the earth, we have emphasized the local and the short-term. Fossil fuels have been the energy source of the technological revolution. The clear climatic signature has appeared that the earth is warming as a result of the carbon dioxide injected into the atmosphere by the burning of fossil fuels. For the disasters this can cause-- turning granaries into scrub desert, the inundation of coastal cities-- there is no local solution. the carbon dioxide put up by one country does not respect national sovereignty.

There are other issues of this sort-- acid rain, topsoil erosion, tropical deforestation. The United States and the Soviet Union have booby-trapped the planet with 60,000 nuclear weapons-- certainly from high-minded, patriotic motives. If you add the immediate and long-term fatalities that would follow from a nuclear exchange, you come to several billion people. But there are only five billion people on the planet. The nuclear arsenals in a very real sense challenge the continuing survival of the human species.

What astonishes is that nuclear arsenals have not accomplished their purported goals. Both superpowers-- and all the rest of us-- are exquisitely vulnerable to nearly instantaneous annihilation. The search for security has failed. It is clearly essential to redefine the concept of national security. Fortunately, there have been some hints of recent progress.

Nuclear weapons are cheap. Military expenditures on conventional weapons have been enormous. Since 1945, the United States alone has spent \$10 trillion dollars in military expenditures. What could you buy for this enormous sum? The answer is-- everything in the United States except the land. Every skyscraper, house, ship, train, baby diaper and pencil. On what could we spend that money today? On making the planet agriculturally self-sufficient. On prodigies of art, architecture, invention. But of course we cannot spend it now. It has already been squandered.

The traditional arena of interaction of nations has been competitive, with brief interludes of amity. The United States and the Soviet Union have been in that situation for many decades. If we must compete, let us find other areas to compete in. Let us compete in eliminating corruption in our countries. Let us have an honesty race. Let us compete in devising the means of agricultural self-sufficiency for the poorest billion people on the planet. Let us compete in science. Let us compete in inspiring the rest of the world to emulate what we do.

We are undeniably one species. The differences that sometimes divide us are absolutely trivial from any extraterrestrial perspective. We live on the one planet, one lovely world which, as far as we know, is the only possible home for humans, the only world graced by life. This world clearly needs to be cherished and preserved. We must make the future worthy of our children and grandchildren so our species may not only survive-- as the title of this conference suggests-- but to flourish.

# The Ecological Crisis and The Quality of Life.

## A patristic questioning of our triumphalist- Anthropology (Paul Verghese)

The question about the "Quality of Life", i.e., of the human qualities that are really <sup>of human concern</sup> worthwhile to promote, has been coming up to the surface from several directions at once.

The ecological or environment crisis is perhaps the best <sup>occasion for such awareness.</sup> known, but people generally think of the ecological crisis only or mainly in terms of the pollution of air <sup>and</sup> water, or the conservation of forests. The range of ecology is <sup>far</sup> much wider, and the solutions to the problems raised go <sup>much</sup> beyond the scope of technology. Ecology means a scientific understanding of what human beings do to their environment <sup>in the</sup> process of inhabiting (~~occupying~~ <sup>oikein</sup>) the earth and making a livelihood out of it. Man needs not merely air and water to live. He needs energy from the earth, both in the form of food for his body and fuel for his productive work - all the way from cooking his food to sending rockets to the moon or Mars. In the good old <sup>pre-industrial</sup> days a man consumed <sup>per hour</sup> only as much energy <sup>per hour</sup> on the average as a 100-watt bulb did. Today each human

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being <sup>inhabiting certain parts of</sup> our earth consumes about 60 pounds of steel ~~a~~ a day, in addition to large quantities of copper, zinc, aluminium, lead and petroleum. His energy needs have grown, in industrial societies, from 100 watts an hour to 10,000 watts an hour. That is <sup>almost a</sup> 10,000 per cent increase! Scientists suspect that the energy supply in the world is limited, and that we cannot go on making unrestrained demands on the poor planet earth.

But the ecological problem is not simply a question of the quantity of energy consumed; there is the further question of the sheer inequality of energy consumption. A U.S. Senate report admits that the total amount of energy consumed by Americans alone in the ten years from 1959-1968, exceeded the total amount of energy sources consumed by the whole of humanity in the whole of its history before 1959. If the American rate of consumption of resources was to be adopted by the whole of the world's population today, in six years ~~there~~ ~~will be no more petrol in the world.~~ the total known petroleum resources ~~would~~ of the world would be exhausted and in less than a year all the iron, copper, sulphur and timber resources would be exhausted. ~~The present available sources of ~~electricity~~ from water would also be exhaust.~~ Can we go on increasing the per capita consumption of resources

anywhere in the world without wondering where all this consumption of resources is going to land us in the fairly near future. "Spaceship Earth" is not a far-fetched concept. We are on a planet travelling through space, with only a limited quantity of resources in it. Unless we use some calculated restraint in consumption and production, and not only in population ~~control~~ <sup>growth</sup>, we are simply doomed to planetary suicide. No wonder people are talking seriously not only about zero population growth, but also about zero economic growth.

The public is only just beginning to hear about the Club of Rome report. The Club of Rome is an exclusive club of the Industrial Economic establishment of the <sup>capitalist</sup> western world, membership being limited to distinguished bankers, industrialists and scientists specially invited. Now about 25 countries are represented in the membership. The Report was prepared by a team of 17 scientists from various fields and ~~was~~ published in January 72 under the title The Limits to Growth. (197 pp.). Time magazine had a review of it in its January 24<sup>th</sup> issue, and <sup>an</sup> essay based on it in the issue of August 14<sup>th</sup> this year.

The conclusions of the report have been radically questioned by critics, on the ground ~~that~~

That the methodology used by the computer is faulty. The main conclusion is that if population grows at the rate of 2% per year and industrial production at 7% annually, as they are now doing, sometime during the life-span of children born today, the world would run out of essential natural resources like coal, oil and metals. The critics counter by arguing that technology can find new resources, and new techniques of recycling resources in order to reuse ~~was~~ so-called waste materials. Sea water, for example, is a practically limitless resource and techniques have already been developed, though still commercially unprofitable, to extract hydrogen from sea-water by electrolysis <sup>or thermal decomposition</sup>. New techniques are on the way to being perfected for extraction and liquefaction of hydrogen for use as fuel, though these techniques involve the use of nuclear reactors, a proliferation of which may have their own disastrous consequences. But the fact that it was liquid hydrogen that ~~powered~~ fuelled our moon rockets has its own significance for the future.

~~But~~ Quite apart, however, from the risk of exhausting the resources of spaceship earth, the cry to halt uncontrolled economic growth has its <sup>specific</sup> ~~own~~ rationale. The O.E.C.D. has recently ~~published~~ put out a publication

entitled Science, Growth and Society, which says in measured tones:

"Many aspects of developed society are approaching a condition that may be described as the precursor of saturation, in the sense that things cannot go on growing much longer on some lines without reaching fairly fundamental limits. Indicators of saturation are present in total population, pollution of environment, size of urban conglomerations, in traffic, even in higher education..... The general public will be slow to accept the full implication of the goal of harmony of man and his environment, it does not yet recognize the costs, both in economic terms and in terms of limitations on freedom of individual choice - and it will be only slowly educated to understand and accept them."

If the question could simply be limited to Z. P. G. and Z. E. G. - zero population growth and zero economic growth things would not have been so complicated. This is the problem of the two-thirds of the world which still needs to attain much faster levels of economic growth to achieve even subsistence economy. If for the rest of the world to achieve the present level of the

developed countries would spell disaster for the whole world not only in terms of resource exhaustion, but also of air and water pollution, unmanageable urban agglomeration, and impermissible limitations on personal freedom, then it is clear that the developed countries, ~~and~~ including Germany, are already economically and industrially overdeveloped, and the need is not just to achieve Z.P.G. and Z.E.G., but to de-develop!

The issue came up quite clearly at the <sup>United Nations</sup> ~~Stockholm~~ Conference on the Human Environment, held at Stockholm from June 5-16, 1972. But it was not resolved there. The concern for ecology dominated the ~~over~~ developed countries. The concern for international social justice was uppermost in the consciousness of the ~~poor~~ still developing two-thirds of the world.

For the over-developed countries, according to speeches by people like Barbara Ward (Lady Jackson) and René Dubos at Stockholm, the way forward was to invest more resources in non-polluting enterprises like Music, ~~Arts~~, Sports and education. This was certainly too simplistic a solution, for it is not easy to find the resources to put into these <sup>service</sup> occupations ~~without~~ and at the same time



Assure high standards of living to the whole population without increasing industrial production. As McNamara, representing the World Bank, put it at the Stockholm Conference, "the achievement of a level of life in accord with fundamental human dignity for the world's two and three-quarter billion poor is simply not possible without the continued economic growth of the developing nations, and the developed nations as well."

The World Council of Churches' official statement at the Stockholm Conference put it more bluntly:

"The point surely is that the environment must strengthen the concern for social justice. Social justice in the context of a global environment will mean a new look at the relation between environment and development. It has been well said that the problem of a fair and just distribution of the world resources is heightened when it is discovered that these resources, whether of minerals, land, air or water must increasingly be seen as a common heritage of all peoples and so developed and used."

Depletion of resources, pollution of environment, inequality of global production and distribution - these are three problems which are now widely recognized as contributing a grave peril for the planet earth and <sup>for</sup> the survival of man on it. The Club of Rome Report's main default was in leaving <sup>out</sup> the third factor - that of inequality of distribution - from the programming of the "World Simulation Model" Computer at M.I.T.

On the other hand, the inter-dependence of the three factors has been recognized by the E.E.C in the policy statement issued by Dr. Sicco Mansholt, President of the E.E.C. Commission (reported in The Guardian, April 11, 1972). He proposes the abandonment of the Concept "Gross National Product" as the measure of growth, and proposes a still undefined new Concept "Gross National Utility", related to the quality of human life rather than the quantity of goods and services produced. He recommends "recycling" as solution for depletion, "non-pollution" as solution for the pollution problem, <sup>and</sup> ~~and~~ a better or more equitable system of distribution on a European Economic Community basis. He would also recommend a sharp reduction in the production and consumption of material goods and increase in the production of ~~specific~~ non-ma

foods and services for the expansion of the mind, for the organisation of leisure and recreation, etc. The focus now shifts from "quantity of goods" to "quality of life".

The same question is being raised from other perspectives, which can only be briefly mentioned here. The most important other field is that of Genetics or Eugenics. Advances in bio-chemistry have opened up three possibilities. (a) Negative eugenics - i.e. the elimination of ~~individuals~~ the birth of individuals with defective <sup>or undesirable</sup> genetic features, thereby improving the over-all genetic heritage of humanity; (b) positive eugenics, i.e. positive encouragement for greater reproduction of progeny from sex cells of parents gifted with valuable or desirable genetic features and (c) Genetic engineering - i.e. the manipulation of the genes of existing individuals to change the information coded in the genes, in order to eliminate undesirable characteristics, <sup>even</sup> to insert new characteristics. In this third area, biochemists is still only at the threshold, and enormous amount of research is further needed <sup>before we can apply to human genes</sup> to apply techniques found effective in micro organisms. ~~to human~~  
~~human~~ Genes

I leave out of account other possibilities of an technology like (a) artificial manipulation of the human brain itself to promote or inhibit certain personality traits, or (b) euphenics, the possibility to repress biochemically the deleterious effects of genetic diseases <sup>like mental retardation</sup> without changing the gene itself, which will <sup>in this case</sup> be transmitted to the succeeding generation, or (c) the determination <sup>+ transformation</sup> of the sex of unborn infants.

These possibilities raise two questions - (a) what criteria are available for deciding what are ~~desed~~ desirable human qualities and what are undesirable? and (b) who makes the decisions and controls the techniques ~~about~~ ~~gene~~ related to genetic mutation, and how can we be sure that the technicians themselves will not mis-use their enormous power to harm or benefit humanity?

We cannot <sup>here</sup> deal with the second question. The first, however, leads directly to the 'Quality of Life' question raised by the ecological debate, which is the main topic of this paper.

are the questions coming from medical ethics, about whether all life has a right to the same amount of space, and the problem of growing cities, the growth of cities and their relation to rural areas, the creation of sufficient housing, transportation and recreation facilities in the cities & so on, directly touching the quality of life.

One could mention several other directions from which the same question about the 'Quality of Life' keeps coming up. One source is medical ethics. In the context of euthanasia, abortion and the possibility of prolonging the life of patients with terminal diseases, medical doctors are asking the question - does all life have the same value? Is it good to live even if living is hell for oneself and for others? What quality of life has a prior claim on the limited resources of medical science?

Another source is the problem of growing conurbation, or the growth of large urban complexes, and the way things are now going, life in the cities would soon become hell, if it has not already begun to ~~be~~ be so in <sup>Tokyo</sup> ~~Tokyo~~, New York and other places. It is not simply a question of <sup>adequate</sup> housing, transportation and recreation facilities - which are impossible for humanity to provide for our growing urban complexes and we will have a real problem on our hands in a few years. But there has been significant deterioration of <sup>the</sup> quality of human relations in the city, that life is <sup>already</sup> insecure, tense, unnering and dehumanising. Quality of life is becoming thus an important topic in architecture and city planning.

The problem of the quality of life is now already at the centre of our urban-technological civilisation. It is not being an alarmist or using the preacher's license of exaggeration, today to say that our science-based technology and the civilisation based on that technology cannot go on developing in the present way without seriously endangering the whole of the life of humanity on this planet.

Neither is it a piece of ideological triumphalism to repeat what many scientists are today saying - that science and technology cannot provide the answers for the problems of science and technology.

The basic issue is <sup>our conception</sup> ~~the notion~~ of the relation between man and "nature" which underlies our science and technology. Already in 1966, Professor Lynn White, the American Medieval historian, read a paper before the American Association for the Advancement of Science, accusing the Judaeo-Christian tradition of being responsible for the wrong developments in science and technology which led to the mindless exploitation of nature and the resultant ecological crisis. It is the triumphal anthropology based on the Genesis stories, concerning of nature as something to be dominated by man that has led to our present situation, according to Professor White. (paper later published in Science March 1967, The Historical Roots of Our Ecological

The Judaeo-Christian tradition has many sins to its credit, but I do not honestly think that Professor White's accusation, which is being echoed by many, is fully justified. I wish to submit <sup>first</sup> that the Anthropology-Cosmology that lies behind our present science and technology is more Hellenic-Stoic rather than Judaeo-Christian. I wish also <sup>secondly</sup> to submit that the solutions to the ecological crisis, the quality of life problems, and even to the crisis of science and technology as such, can come only by a shift from the Hellenic-Stoic to a properly Judaeo-Christian Anthropology-Cosmology. Thirdly I wish to question the hypothesis being advanced in certain quarters that the alternative to our mechanistic Cosmology is to a Cosmology based on mysticism. Each of these points require one lecture for its presentation. I have to content myself here with a mere indication of the lines along which we have to think on these points.

### The Sources of Contemporary Science-Technology

~~The~~ The <sup>popular</sup> attribution of modern science-technology to the Christian view of Man as free to dominate nature has been seriously questioned by many scholars. It is clear that science-technology did not develop from the beginning of the Judaeo-Christian tradition. If the Anthropology of the Book of Genesis could have created science-technology, it should have been born several centuries before Christ. Similarly this theory does not account for the fact that in many regions of the world where ~~Christianism~~ the Christian tradition

was dominant, including the Orthodox countries and the countries of the middle East, the Christian anthropology did not give birth to ~~less~~ modern science-technology.

The birth of modern science-technology is due to a ~~fortuity~~ ~~con~~ fortuitous concurrence of <sup>at least five</sup> ~~several~~ factors:

- (a) the scholastic training of the mind in the middle ages which made the shift from the monastic system of education where lectio of the scriptura was to lead to contemplatio; in scholasticism lectio leads to quaestiones and disputatio, the consideration of various alternative possibilities stating the truth and the elimination of those found to be false, leaving the one possibility, which then becomes the veritas.
- (b) the revolt against ecclesiastical and theological control of knowledge best exemplified in the French Revolution, thus leading to autonomy and creativity in European thought,
- (c) the development of the experimental method which ~~also~~ flourished in the context of Anglo-Saxon empiricism and
- (d) the revival of Stoic-hellenic cosmology and anthropology through the Renaissance and the Enlightenment
- (e) the colonial expansion of Europe which ~~also~~ on the one hand ~~developed~~ demanded accurate knowledge and technology for <sup>the</sup> domination and exploitation of the rest of the world, and on the other hand provided the capital resources necessary for the industrial revolution and the urban-industrial system which fostered science-technology.

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If there was an anthropology-cosmology that provided the background for the development of Western science-technology, it was the Hellenic. More cosmology as developed in Middle Stoicism (second and first centuries B.C.), by Panæti<sup>us</sup> and Posidonius <sup>(3rd century B.C.) 3RD CENTURY</sup> basing themselves on the work of earlier <sup>Stoic masters</sup> Zeno of <sup>CITUM</sup> Citium ~~and~~ (the founder) and <sup>CHRYSIPPUS</sup> Chrysippus (the systematizer). This cosmology was based on certain assumptions which are fundamental in modern science - (a) the world is a single continuum governed by universal laws of causality <sup>THROUGHOUT</sup> throughout; (b) everything in the world is composed of two things in different proportions - hyle and pneuma, matter and energy; (c) the accurate knowledge of the causal nexus that connects all time and space would enable man to predict how things will move and to control the movement within certain limits by providing an immediate operating cause which is within the choice of man.

This lecture is not on the history of science but on the ecological crisis and the quality of life, and on this matter has to be left here. Blaming the Judeo-Christian for the ecological crisis may be fashionable but neither useful nor true.

<sup>The Two Tendencies</sup>  
The important fact is that our system of inhabiting the world, knowing it and using its resources is in serious trouble, and our present kind of science-technology cannot ~~offer~~ offer

as the way out. If one insists like Jacques Monod does in Le Hasard et la necessite' that we have nothing but science and technology to turn to, then we must pessimistically and cynically resign ourselves to the view that we should try to live as best as we can in these circumstances and stoically accept what strict necessity or anagke-heimarmene will inevitably bring to us.

On the other hand there are others who are anxiously suggesting that we should now move to Consciousness III, repudiating the whole of scientific technological culture with its managerial-bureaucratic-mechanistic approach to life. The demand is for a new mysticism, rooted in the physical (e.g. yoga), relaxed, spontaneous, non-aggressive towards nature, emphasizing play rather than work, <sup>promoting</sup> expression rather than repression, and a new free non-possessive man-woman relationship.

The two tendencies in western culture are going in different directions. <sup>Among</sup> ~~the~~ those who still naively insist that technology can solve all the problems belong books like Alvin Toffler's Future Shock and the Club of Rome's Limits to Growth, and Herman Kahn's The Year 2000. Their demand is for better control of exploding knowledge through cybernetics; Again the problem comes up - ~~how~~ <sup>how</sup> can the general public <sup>CONTROL</sup> control the initiated <sup>elitism</sup> aristocracy of the computer-world who will hold in their hands the power to inform or mis-lead the rest of us who have to make the decisions? Among those who suggest the counter-culture line, <sup>besides Theodore Roszak,</sup> we can mention Charles

Leach's The Greening of America, William Irwin  
Thompson's At The Edge of History and Herbert Marcuse  
(One-dimensional Man, On Liberation, Eros and Civilization etc)

Are mechanism and mysticism the  
true alternatives before mankind today? The question is  
significant, because survival is what seems at stake.  
Here is the point at which Christian Anthropology questions the  
very terms in which we are posing the alternatives.  
Our situation is not that we have to choose between ~~next~~ a  
mechanistic cosmology as derived from the Stoics, and  
a mystical cosmology as derived from ~~Plato~~ Pythagoras,  
Plato and the Neo-platonists. But behind these two  
basic cosmologies there stand two Christian world-  
views, which are not properly alternatives, but two  
sides of one cosmology. For the sake of brevity I will  
call one the technological approach to the world, and  
the other the sacramental. In the <sup>technological approach</sup> ~~former~~ <sup>APPROACH</sup>, the basic concern  
is for the manner in which man knows and operates  
upon nature, irrespective of the purpose for which he  
does so. ~~while~~ In the sacramental view of creation,  
the manner of ~~dealing~~ knowing and operating upon reality  
is not in the foreground; <sup>but</sup> ~~and~~ it accepts the world  
of time and space as deriving its meaning and  
significance from a realm beyond it, namely from the  
transcendent creator, and is <sup>therefore</sup> committed to the use  
of the time-space world for one particular purpose -  
namely the manifestation of the Goodness of Creation  
which is its true nature as bestowed by the creator.  
Both the technological approach and the sacramental  
approach are properly Christian, when held together  
and only when held together. Neither the mechanistic nor  
the mystical approach is the true alternative.

The sacramental and the technological held together - This is the authentically patristic view of the relation between man and the rest of creation. To take only one of the <sup>FATHERS</sup> ~~Fathers~~ as an example, Gregory of Nyssa who lived in the fourth century, ~~he~~ would insist that man belongs fully to the Cosmos, and participates fully in a world whose basic characteristics are to be extended, <sup>(space)</sup> and changing, <sup>(time)</sup> in space-time. "Man finds himself in alteration (alloiōsis) and change (tropē)" The creation as well as man is in a continuous process of unfolding, and man participates in this process, both passively as creation and actively as Creator.

If I may quote from a Dutch dissertation on the Anthropology of Gregory of Nyssa (S. de Boer):

"The participation of total man in the divine life has a two-fold purpose: it makes man into veritable man, and it fully brings out God's glory in His creation... By means of this participation (in material nature), man mediates God's doxa to the world; at the same time man is capable of enjoying both sides of the good things around him. Things material are not evil in themselves .... To man, matter is a challenge, asking to be shaped; at the same time it is a threat." (pp 465-466).

Gregory argues that what we call matter has no hypostasis or subsistence of its own, but becomes good or evil depending on the way in which it is used. The transformation of man

and the transformation of matter by man are two aspects of one process. Technology and the eucharist have to be held together, in this view. Anthropology and Cosmology always go together.

What has happened to our science-technology is that it has become separated from the sacramental understanding of material reality as the bearer of God. For the sake of a quick development of science-technology western mankind took an exclusively triumphalistic unsacramental <sup>one-sided</sup> anthropological stance, and there <sup>in that Faustian exodus</sup> begins the deflection of technology from the path of the good. But in that process of technology becoming one-sidedly emphasized, western mankind has very nearly lost the very capacity for a sacramental understanding of reality. This, it seems to me is the saddest part. One cannot simply develop this sacramental sense of relation to God through material reality by just wishing to do so. There has to be a whole re-conditioning of the human consciousness through very intensive corporate disciplines, in order to overcome the alienation from the sacramental sense that has already eaten very deeply into a technological culture. The sacramental mode is the mode of man's participation in the divine through the created reality. Without it man perishes. Man stands isolated and alienated from both material reality and from his fellow-men as a result of a technological culture which neglected the sacramental approach to reality. The recovery of community with ~~man~~ fellow-man, with history, and with nature, and through these with God alone can be an adequate basis for the recovery of human nature itself.

Neither a shift from mechanism to mysticism,  
nor the cybernetic miniaturisation of knowledge,  
neither zero population growth plus zero economic  
growth nor bracing ourselves for Future  
Shock, can avert the Catastrophe ahead of  
us. Only a <sup>Corporate</sup> Return to God, through ~~the~~  
Community and through a sacramental experience  
of reality, ~~can~~ worked out in a context that  
does not run away from man's responsibility to  
Confront matter through technology, can begin  
to turn the tide. The Quality of life depends  
on the reality of our relation to the source of life,  
through our relation to fellowmen and nature.

## Conclusion

There is one basic difference between the triumphalist secular anthropology that lies behind contemporary science-technology and authentically Biblical-Patristic Christian anthropology. This difference focuses primarily on the relationship between man and reality. Christian anthropology reckons with three basic categories or levels of reality and places man at the middle - God-Man-World is the usual Christian pattern. Secular anthropology relegates God either to non-being or to some insignificant corner of existence, and proudly and triumphantly tries to take over the world <sup>He has only two levels of reality - Man-World. And Man wants to go on top</sup> in his own right. The inevitable consequence is catastrophe as has been shown throughout the ages of history.

Biblical-Patristic anthropology makes four basic assumptions which secular anthropology and western culture are reluctant to accept, but until these assumptions are accepted and their practical consequences worked out, I see no solution to the problems now emerging in secular thought in relation to the quality of life.

The first assumption is that the world open to our senses is not the sum-total of reality, and that the world open to aesthetic awareness is only a lower mode of reality's presenting itself to us.

The second assumption is that mankind is a middle reality between God and the World, particip

both poles of reality, ~~the~~ i.e. in the energies of the eternal, unchanging, trans-temporal-spatial reality of God, and in the perpetually changing time-space reality of the created order. It is only by remaining in this tension between God and the World that he can remain man and grow to the fullness of ~~his~~ his humanity.

The third assumption is that mankind is now caught in a ~~chain~~ <sup>downward spiral</sup> of evil, which is called sin, and by seeking to make himself master of the world ~~by~~ through science-technology without at the same time ~~growing~~ being placed in the upward spiral of righteousness, he remains in sin and moves towards death.

The fourth assumption is that all mankind in all space and time is one, and when man seeks to make himself as individual or as family or <sup>as</sup> nation or <sup>as</sup> region or as class or as interest <sup>or as generation</sup> group, the centre of his scientific-technological or religious existence, he again betrays his true humanity.

The fifth assumption is that mankind's double participation in the two poles of his existence - i.e. God and the World, cannot be an intellectual or operational affair and cannot therefore be a matter for science and technology to decide, ~~or~~ for theology to effect. The double participation can be effectively maintained only through the participation in the life of the Community of the Spirit through the sacramental mysteries, combined with a solid scientific-technological mastery of the world. All theology and all science-



# James Lovelock: The State of the Planet

## Summary

Imagine that you are standing on the stump of a giant red-wood tree that has just been felled. It was a vast tree weighing over 2000 tons and was over 100 meters tall, a spire of lignin and cellulose. A strange thing about this tree is that during its life nearly all of it was dead wood. As a tree grows, there is just a thin skin of living tissue around the circumference. The wood inside is dead, as is the bark that protects the delicate tissue. More than 97 per cent of the tree we stand on was dead before it was cut down.

Now in this way a tree is very like the earth itself. Around the surface of the earth is a thin skin of living tissue of which both trees and humans are a part. Rocks and air are dead, although both are either the direct products of life or have been greatly modified by its presence. Is it possible that the earth is alive like the tree?

My view of the earth sees a self-sustaining system named Gaia like one of those forest trees. Although some colleagues are beginning to take this notion seriously, most prefer to see the earth as just a ball of rock moistened by the ocean. If mainstream science is right and the earth is like this, it might not matter what we do to it as long as we don't foul it too much for our own good.

But what if instead the earth is a vast living organism in which typically the separate species are expendable? If a species such as humans adversely affects the environment, then in time it will be eliminated with no more pity than is shown by the micro-brain of an ICBM on course to its target. If the earth is like this, then to survive we face the hard task of reintegrating creation, or learning again to be part of the earth and not separate from it.

The life of the scientist used to be that of the natural philosopher closely in touch with the real world. It was a life both deeply sensuous and deeply religious. I sometimes wonder if the loss of soul from science results from sensory deprivation. A consequence of the fact that 95 per cent of us scientists live in cities. How can we love the living world if we can no longer hear the bird song, never smell fresh air, nevermore see the stars?

The attraction of the city is seductive. City life is a soap opera that never ends. It reinforces and strengthens the heresy of humanism, that narcissistic belief that nothing important happens that is not a human interest.

City living corrupts. It gives a false sense of priority over environmental hazard. We become inordinately obsessed about personal mortality. We tend to ignore the consequences of greenhouse gas accumulation, agricultural excess and forest clearance. We are witnesses to the disintegration of creation without realizing we are the cause.

The humid tropics are both a habitat for humans and the heartland of Gaia. That habitat is being removed at a ruthless pace. Yet in the First World we try to justify the preservation of the tropical forests on the feeble grounds that they are home of rare species-- even of plants containing rare drugs that could cure cancer. This could be, and yet the tropic forests are so much more than that. Through their capacity to evaporate vast volumes of water, the forests keep themselves cool by wearing a sunshade of white, reflecting clouds. Their replacement by crude cattle farming could precipitate a disaster for the billions of poor in the Third World.

There are so many things we do that are harmless in moderation and malign only in excess. I find it helpful to think of the three deadly C's as cars, cattle and chain saws. Yet none of them evil if used in moderation.

I speak as the shop steward of the bacteria and the less attractive forms of life. My constituency is all other life than humans. I have taken this role because there are so many who speak for people. To see the earth as a living organism makes tangible the concept of stewardship. We can stay as selfish as we are but be guided in our selfishness to keep a world that is healthy and beautiful-- for our grandchildren and our other partners in Gaia.

Global Forum  
on Environment and Development  
for Survival

Moscow, USSR

Meditation given by  
Metropolitan Dr. Paulos Mar Gregorios

Let us first remember in silence all the victims of  
catastrophes - of the Armenian Earthquake and other earthquakes  
all over the world - victims of Chernobyl and of Three Mile  
Island

of train and plane disasters  
of oil spills and nuclear radiation  
of Hiroshima and Nagasaki  
of cyclones and tornados  
of tidal waves and floods  
of poisons and drugs  
of AIDS and other contagious diseases  
of wars and armed conflicts  
of revolutions and popular uprisings  
of all forms of ecological catastrophe  
of poverty and want  
of ignorance, ill-health and illiteracy  
of racism and sexism  
of greed and violence  
of torture and terrorism  
of pollution and toxic waste  
of genocide and concentration camps  
of police and military brutality.

Let all the earth keep silence before him ...

For it is now the turn of the earth to speak ...

Hark, the earth speaks ...

Nay, she is groaning ... she asks us to give utterance to  
her groans and prayers.

Listen to her complaint before the Lord about us, her  
children.

My children, she says, something has gone wrong with them.  
They act as if they want to kill themselves, along with me their  
mother, and all life I have born and brought up through the  
millennia.

They are full of insatiable greed, she complains: their  
cupidity knows no limits. They are so aggressive that they  
would like to blow each other up with nuclear weapons. Their  
greed is such that they would exploit their own brothers and  
sisters. Their cupidity is so limitless that they would rape  
and torture, kill and trample on their fellow-creatures'

dignity, just to satisfy their perverse lusts and mad desires for gratification.

Listen, she stops, and she moans again, weeping for her mindless children - in pain and agony ...

Ah, now she takes up her complaints again ...

They are my precious children - these human beings to whom I have given birth. And yet, they now have power to destroy me and all my children, all living beings, including themselves. Have mercy on them and on me, Lord ...

They would upset the balanced habitat in which I seek to nurture them.

They burn up all the oil and gas and coal that it has taken me thousands of years to develop in my womb. They do not think of future generations. They release carbon dioxide, methane and nitrogen monoxide, and other gases which heat up the atmosphere which it has taken me millions of years to develop for their sake, and for the sake of all life. They disrupt the soil microbial communities, and release more of these greenhouse gases. The polar ice is melting. The ocean level has risen. The ozone which guards them from the harmful rays of the sun is already depleted. Their rain is acid: so is their snow and fog even.

So many life forms, my children, are becoming extinct every year; the desert spreads, but they keep on mindlessly felling trees. They empty billions of tons of toxic waste into the oceans and rivers and kill off tens of thousands of seals and millions of fish and other marine life.

I am tired of complaining, says the earth and weeps again; now she speaks, in a different tone. Have mercy upon them, she says. They are my children. I love them, even when they care not for me. They need help, Lord, she now says. Not for my sake, but for their own sake.

Teach them compassion, Lord, she now prays, compassion for themselves, for their fellow-humans, for future generations yet to be born, for trees and plants, for birds and fish, for all life in earth and air and sea. Teach them to respect life, to practice justice, to desist from oppression and exploitation, to learn war no more, to pursue the paths of peace, to care, to restrain their greed and lust, to grow in love, to seek fulfillment in inner discipline, compassion and prayers, rather than in gratification of lust and greed or in violence and oppression, in drugs and consumerism.

x

x

x

Finally the Lord answers: I groan with you, O Earth, and with all your children. Their pain is my pain. Their suffering is my suffering. When they fail to love, they fail me, and fail themselves. They are made for love, for rightness, for truth, for peace. But they are free. When they turn to me, I shall

respond. I shall then turn your pain into the birth pangs of the new. The new is love and compassion, self-mastery and creative freedom, disciplined communities which live in joy and peace, truth and justice. I wait in pain, for them to turn to me, that I may heal and make them whole.

x

x

x

Come Lord, come as the fire, to burn our trash  
Come Lord, come as the wind, to cleanse  
Come Lord, come as the light, to show us the way  
Come Lord, come as the healer, and make us whole  
Come Lord, come as love, that we too may learn to love  
Come Lord, come as the Saviour, to save us from ourselves  
Come, come to comfort, to convert, to convict, to  
consecrate, to create the new.

An Eastern Orthodox Perspective of 'Nature, Man and God'

(Paul Gregorios)

'Nature' is not current coin in Biblical or Eastern Orthodox language. It is a concept of Indo-hellenic origin which the authentic Christian tradition finds problematic. If it refers to "all things" (ta panta) with their structure and law-like order constituting a system, a unity, then man is essentially a part of that system; if one were to refer to nature in a non-inclusive way, one would have to say "sub-human nature", or "non-human nature" or "nature minus humankind" or something awkward of that kind. That will be like a cow referring to nature as the "non-bovine nature" - rather absurd.

If the assumption behind the term is that nature is something which exists by itself (naturally), as distinct from human culture, again the authentic Christian tradition has to reject the assumption that nature exists by itself. The creation is not self-generating or non-contingent. It does not have autousia or self-existence, and that is what distinguishes it from the Creator who alone has such autousia.

If one may put it rather provocatively, nature does not exist; only the creation exists. Nature is a false concept, bound to mislead. The earlier we abandon it, the less we expose ourselves to erroneous thinking.

The Creation - ktisis - includes humanity. To talk of the creation minus man is absurd also. We do not talk of man's relation to the creation, as if there were two separate realities. The most one could do is to speak about Man's place in creation, and his relation to it in terms of that place.

The creation, in Eastern Orthodox thinking, is a dynamic entity, not a work that was completed in six days as the Genesis account is sometimes interpreted. It is a process for which the arché or source is to be sought in the creative energeia of God. Its destiny or telos is also given to it in the creative act of the divine energeia. That same energeia provides it with the dynamic necessary to move from arché to telos, from inception to perfection, from beginning to fulfilment. Thus the creation has no self-existence. The energeia of God is the source, goal and dynamic of creation.

How is that creation to be understood, and what is the role of Man in it? To answer these two questions, this paper resorts to a certain amount of necessary speculation, based on the Patristic heritage which shaped the classical Christian tradition. Heavy reliance is placed on Gregory of Nyssa (ca. 331 - 389 A.D.). Gregory is the only philosophical theologian of the undivided Christian Church who has dealt fundamentally with these themes and who is acceptable to the authentic tradition (Origen is not accepted; Augustine of Hippo and Maximus the Confessor are rejected by my particular tradition).

1. The sources, norms and limits of Christian understanding - some methodological considerations

- a) Epinoia or the Power of Conception and Creativity

Human beings are endowed with the capacity to conceive and to create. This capacity is called epinoia by Gregory of Nyssa. Sense-impressions are the raw-material through which the human mind informs itself. The nature of the human mind enables, structures and limits the information intake. It is the faculty of epinoia which makes understanding possible, and provides the possibility for man to imagine and to create the marvels of music and the arts

of architecture and technology. Man's relation to his environment is shaped by this faculty in terms of both understanding and engineering.

Theoretical understanding, however, cannot be divorced from praxis. The head and the hands have to be coordinated, and language serves that co-ordination. Gregory of Nyssa regards the three elements as essential to the proper relationship of Man to his environment - the head, the tongue and the hands - understanding, language and praxis. Epinoia or the power of conception and creativity has to do with all three as well as with their mutual co-ordination

b). Evil, Sin and Error

The epinoia, however, is not free from error. It is capable of creating chimaeras, of conceiving things which do not and cannot exist. The root of error is in sin. Sin means that man is now not in the state in which he was created. By a primordial act of evil, the human mind is now incapable of knowing the truth. It means simply that the possibility of error lurks behind every conception of truth. The world as we now experience it is also shaped by this mixture of error in the epinoia, caused in turn by the mixture of evil in the human being which was created as good, though capable of both good and its opposite, evil.

True understanding therefore demands freedom from this admixture of evil. Only as the human person becomes progressively liberated from the mixture of evil does his epinoia also begin to function fully as it should. All three, understanding, language, and praxis, are affected by the mixture of evil. Only transformation of the being of the human person can lead to error-free understanding, language and praxis. This transformation of the human being is ultimately effected through the processes of death and resurrection, but that process



can begin already here, as one participates in the death and resurrection of Christ, through life in the Community of the Spirit.

c) Life in the Community of the Spirit -  
Participation in the Living Tradition of Christ

The Community of the Church has its own understanding, language and praxis. This understanding, language and praxis always transcend the rational. No final conceptual apprehension of reality is available to the community itself, or to any of its participants. The best mode of apprehension and expression is the Eucharistic act. There all dualities are transcended, in an act of union between the Creator and the Creation in a participation in Jesus Christ the Incarnate. Time and space are also transcended in this act, where eternity breaks into time and transforms it; where union is achieved with "all the saints" in space and time; where matter is the bearer of the Spirit, the Bread of Life; where God, Man and the Creation are all united in one single act of mutual self-giving; where the creation is offered up to God in self-offering and where God offers Himself to the creation through the Body and the Blood; where the world is transfigured to bear the glory of God; where the subject-object dichotomy itself is overcome in the act where the offering, the offeror and the one to whom offered are united in love; where reason and the language of reason merge into the act of love, where memory and hope bring together the past and the future into the single moment of present eternity.....

That kind of theological language both baffles and at times infuriates the scientific observer, for it refuses to be held by the canons of ordinary language speech. But both rite and symbol are such transcendences of ordinary speech. What follows is only an attempt to translate into banal prose some of the insights about the nature of the Creation maintained in this strange community of the Spirit.

## 2. The Creation - Contingent, Extended, Dynamic

a) The nature of matter. Gregory of Nyssa made it very clear that matter as such is an abstraction never encountered by us. What we see is matter with qualities, the elements with their atomic structure. Gregory knew nothing of the sub-atomic world of particles; what he says about matter as such being an abstraction applies at the macro-level of atomic molecular matter.

But Gregory never made the mistake of saying that the universe is composed of matter in motion. Neither did he regard matter as an inert vehicle for the qualities. In fact he insisted that minus the qualities matter is altogether nothing, and has no existence apart from the qualities. Different forms of matter are but different confluences of qualities.

He went one step further, in insisting that matter is nothing but energy - God's creative energy, dynamically moving from one form to the other. The basis of this matter is energy, the coming together of God's will that it should exist and God's word which brings it into existence. Thus God's will-and-word, which is the energeia of God, is the basis of matter. Matter is the manifestation of God's energeia, contingent upon God's will-and-word, dynamic and changing.

Today with our limited knowledge of the sub-atomic world, we can go further. We can confirm Gregory's insight that the world of sub-atomic particles which constitute matter are a dynamic network of energy events continuously changing, forming, dissolving, re-forming. There are no 'basic building-blocks', no solid entities occupying an absolute space. Energy and mass are interchangeable in an orderly way ( $E = Mc^2$ ). We cannot explain 'nature' in terms of 'elementary particles' and their primary qualities. The mechanistic picture of the universe popularized by 17th century science belongs to the Museum of antiquity. Matter-in-motion is no longer an adequate or tenable fundamental idea to explain the nature of the universe.

b) The unity and inter-relatedness of the Universe

Most of our rational thought relies too heavily on the division of the universe into classes and species, into epochs and ages, into centuries and events, into separate objects and separate happenings. We find this division useful and necessary. But success in using is no validation of truth; the pragmatic criterion so central to modern science is at best a questionable test of truth.

What we have, more clearly in the sub-atomic world and less obviously in the macro world, is an interaction between the observing system and the observed system - not something which can be called absolute knowledge of an independent object. In observing the sub-atomic world, however, the observing system (that is ourselves with our experimental apparatus) is always understood in terms of classical physics, while the observed system has to be understood at the level of quantum and relativity theories which do not fit into classical physics. It is only in terms of classical physics that the observer-observed dichotomy can be faithfully maintained. At the sub-atomic level the observed and the observer are united in one inter-locking system.

In an area where one's technical knowledge is severely limited, the theologian resorts to the authority of the scientist. A recent article by David Bohm puts it this way:

"One is led to a new notion of unbroken wholeness which denies the classical idea of analyzability of the world into separately and independently existing parts... We have reversed the usual classical notion that the independent 'elementary parts' of the world are the fundamental reality, and that the various systems are merely particular contingent forms and arrangements of these parts. Rather, we say that inseparable quantum inter-connectedness of the whole universe is the fundamental reality, and that relative independently behaving parts are merely particular and contingent forms within this whole." <sup>1)</sup>

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1) D. Bohm and B. Hiley, 'On the Intuitive Understanding of Nonlocality as Implied by Quantum Theory', in Foundation of Physics, Vol.5 (1975)

What we regard as solid, stable, material objects with their apparently objective existence dissolve, at the sub-atomic level, into waves of probabilities, which are primarily patterns of inter-connections. We cannot observe nature as an object. If Heisenberg is right, 'what we observe is not nature itself, but nature exposed to our method of questioning'.<sup>2)</sup> When our experimental arrangement is modified, the data yielded are also different. The observer thus becomes participator in the reality which he is measuring, and he can never know how that reality appears apart from his participation, or the participation of someone else.

The idea of an 'objective world' independent of man has thus to be abandoned, and there are no two realities called Man and Nature which can somehow be separately observed.

Neither can we any longer hold space and time as separate realities. Space-time, matter-energy, particle-wave, rest-motion - all these dualisms of classical physics also disintegrate at the sub-atomic level. Even the concepts of existence and non-existence seem to be problematic, judging from the literature. Is Robert Oppenheimer right when he says:

"If we ask for instance, whether the position of the electron remains the same, we must say 'no'; if we ask whether the electron's position changes with time, we must say 'no'; if we ask whether the electron is at rest, we must say 'no'; if we ask whether it is in motion, we must say 'no'." <sup>3)</sup>

If he is right, then it is no longer right to say that everything is in perpetual change. Polar opposites like permanence and change, existence and non-existence seem to co-exist, and even the most dialectical ordinary

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<sup>2)</sup> Werner Heisenberg, Physics and Philosophy, London, 1963 p.57

<sup>3)</sup> J.R.Oppenheimer, Science and the Common Understanding, O U P London, 1954. pp 42-43

language fails to do justice to the complex inter-locking web that is our universe. The time-honoured principles of non-contradiction and the excluded middle fade into insignificance as being of use in only a very limited area of discourse.

What emerges is one universe, man inextricably inter-locked within that system. It is this notion of the creation as one inter-related web, space and time being merely aspects of it and not any kind of medium or vessel in which realities exist, which the authentic Christian tradition (which some wrongly insist on calling the Eastern Orthodox tradition) affirms. The whole creation is a single unit, with space and time as merely cognates within it. It is absurd, in this authentic tradition, to ask any questions about 'the time before Creation', for time begins only with Creation. The beginning of Creation being also the beginning of time, there is no before and after beyond that beginning.

Modern physics puts a couple of questions to the classical Christian tradition. These relate to the question of change and extension. Gregory of Nyssa would insist, for example, that change and extension are the essential characteristics of the created order, that everything in space-time is extended or distended, and that everything is continuously changing.

The notions of change and extension can no longer be held in that absolute a manner in the sub-atomic world, though even these micro-entities called particle-waves have their own probabilities of location and momentum. This means simply that the notions of extension (diastēma) and change (tropē) in the classical Christian understanding of creation have to be suitably modified in order to accommodate the new insights of nuclear physics (relativity and quantum theories).

But the unity and inter-relatedness of the cosmos as affirmed in the classical Christian tradition becomes only further confirmed by the revolutionary new hypotheses of relativity and quantum physics. Man is inseparable from that unity. There is no nature as "Creation minus Man". We will deal with the place of Man in Creation in the next section.

c) The nature of time . While it is true that modern physics does not permit the notion of time as a separate entity in which events occur, but sees it merely as a dimension of reality, the fact remains that we human beings experience time in a peculiar way. This peculiar way is only tangentially affected by the Relativity understanding of time as a dimension of four-dimensional reality.

To put it very bluntly, we experience time as death. Not only in the sense that every moment of time brings death closer, that every tick of the clock is the footfall of approaching death. We experience time as death in a different way. Every moment is born dead, for by the time we are able to say 'now' and name it, the 'now' has gone and become the 'then' of the past. The moment called the present is a fleeting point of intersection between two streams crossing each other (from our perspective), stream of the future passing over into that of the past. We can hold on to the past by 'memory' and the future by 'hope', as Gregory of Nyssa said. But the present there is no way of holding on to. It fleets. As Augustine said, it sweeps us away and nothing in it offers a foothold to stay free from the flow.

Time is death for matter too. If Carnot's Second Law of Thermodynamics still holds, then everything, the whole cosmos is in process of giving out energy and moving towards the stable equilibrium called death. "When a closed system containing a large number of molecules is left to itself, it assumes a state of maximum entropy: that is, it becomes progressively less ordered."

But life defies death, at least for a while. It creates more ordered systems, culminating in the evolution of the human brain, the most centred and complex system of organization of molecules that we know. It has been achieved through death and reproduction, through the process of a bio-cultural evolution that has been going on now for at least 10,000 years of known cultural history.

Time is the arena where this struggle between death and life is continuously going on. Death disintegrates, life organizes. But life is here, in our time, always subject to death, eventually.

The Christian understanding of Creation insists that this state of affairs is not final, that death is a late comer into the cosmos, on the trail of that other enemy, sin. The present creation, or the creation as we presently experience it, subject to time-as-death, good-being always mixed with evil-non-being which drags it into the jaws of death, is to be liberated from both evil and death. This is a basic affirmation of the authentic Christian tradition. 'Nature', red in tooth and claw, is not the last word. Sin is not the last word. Neither is death, nor Carnot's Second Law.

Life has triumphed over death, good over evil, being over non-being, in the death and resurrection of Jesus Christ. Therefore we affirm our hope in a new heaven and a new earth, where time itself is transformed into an aeon where there is neither death, nor consequently birth or marriage.

Whether this happens through a reconstitution of matter itself, or through a transformation of our perceiving apparatus (in the bodily resurrection), or through both, is a matter which is hard to settle at the moment.

But the nature of Creation as we now experience it is intimately bound up with our experience of death, and in our Christian understanding of Creation, we do not take the 'given' as somehow final.

Our Christian hope negates the present in order that it may become the future. We do not settle in this death-bound sin-infested 'natural order' as if it were the final reality. Neither can we regard the knowledge, both theoretical and operational, of that present natural order, as somehow the noblest of pursuits. Science and technology, which relate primarily to the knowledge of this decaying order of the present world, has its value in terms of making even this sin-infested world show forth the glory of God. But our hope negates this world which science studies, for we wait for a new heaven and a new earth where righteousness dwells, from where evil and death have been banished.

Not that the new heaven and the new earth are totally discontinuous with the present ones. Whatever meaning the present world has, comes from that element of continuity with the coming world. Here we Christians differ from the Hindu Vedantin who denies any significance whatsoever to the present time-world. For us, the significance it has is derived from the significance it will have in the new.

### 3. Man's Place in the Universe

This transcendent value of the present universe in terms of its relation to the coming universe, is a value maintained by Man. Where that value is denied, as it was in the post 17<sup>th</sup> century atmosphere of secularisation, what results is a lack of respect for the creation. As Richard Schlegel put it:

"With no transcendent value postulated for nature, men were free to act on a philosophy of exploitation of the apparent great machine within which they lived. The same cosmology that allowed this license also gave, thanks to the validity of the Newtonian physics, a powerful weapon for constructing devices for the control of nature. Further, although man was of the world, he also stood apart from the scheme; for his intellectual and spiritual life were not to be related to the inanimate mechanisms of the natural world generally.....



Man's own welfare, therefore, as conceived in the light of his wants and powers, could in good conscience be furthered by any desired use of nature. It was an ultimate sadness that man was a puny and probably transitory phenomenon, without meaning in the great surrounding universe; but, also, he could display his ascendancy on earth, and, with a bit of good fortune, perhaps enjoy at least the major part of this life." 4)

What was necessary for the development of modern science was not so much the Christian matrix as the denial of it in post 17<sup>th</sup> century secularization in Europe. It is or by denying the transcendent significance of the present universe, and by isolating himself from the universe, so that value attached only to himself and his desires, and not to the universe itself, that he was able to brace himself for the thoughtless exploration and exploitation of that universe. Making the universe an object was the consequence of a double transformation in the European mind - the denial of any transcendent significance to the universe, thereby making himself the subject and the universe the object.

The authentic Christian tradition calls in question both attitudes. The universe, though subject to death has relation to the new heaven and the new earth, and so has transcendent significance; man is an integral part of that universe, and cannot stand outside of it, making himself the subject and it the object. The universe is not an object, nor is it made up of discreet and independent objects. Man is not merely a resident in the universe surrounded by different objects which he is free to manipulate. He is an inextricable part of that universe, and has emerged within it.

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4) H.R.Schlegel, 'Quantum Physics and Human Purpose', in Zygon (8), December 1973. pp. 200 ff

The Christian tradition holds to three fundamental lines of thought about Man's place in the universe:

a) The Concept of Adam. Adam means that which came out of Adama, the earth. His body has the same components as the earth. In fact all living beings have bodies composed of the same elements as we find in the earth. Man shares this aspect of his being with animals, plants, and inorganic matter. "The first man is of the earth - earthy", as St. Paul put it.

b) Man as the Crown of Creation. The Tradition accepted an elementary form of the doctrine of evolution thirteen centuries before Charles Darwin. Gregory of Nyssa in the 4<sup>th</sup> century held the view that it was the same force of creation operating in inorganic matter that shaped the plant world or vegetative sphere of life, the animal world or the bio-sphere, and the human world. He goes further to say that the human body incorporates all the lower worlds - the animal and the vegetative elements exist and operate in the human. While Gregory rejected the Man-as-microcosm idea, he held the view that Man in a sense recapitulates and represents the whole universe; that in Man the cosmos consciously responds to the Creator.<sup>5)</sup>

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5) "Scripture informs us that the Deity proceeded by a sort of graduated and ordered advance to the creation of man. After the foundations of the universe were laid, as the history records, man did not appear on the earth at once, but the creation of the brutes preceded his, and the plants preceded them. ~~Thereby~~ Scripture shows that the forces of life blended with bodily nature according to a gradation; first it infused itself into insensate nature, and in continuation of this advanced into the sentient world, and then ascended to intelligent and rational beings."

Gregory of Nyssa, On the Soul and the Resurrection, Nicene and Post-Nicene Fathers, Series Two, Vol.V:441 B. Patrologia Graeca, Vol.46:60 A.

c) Man as Co-creator with God. Man, as part of creation, is not an object for the cosmic forces to mould at their will. He is free. This means that he is not passively acted upon by the universe, but is capable of understanding and acting upon the universe. This is what the Tradition means when it speaks about apatheia as freedom. Patheia or passion is passive. It means being acted upon and carried away by forces. Apatheia is active. It is not apathy, but a heroic refusal to be passive. If God is Creator, and man is made in His image, Man also has to be a creator in some sense. He carries out this creativity by shaping himself, his society and his environment. This is his freedom - limited, but real. Science and technology can be instruments in the exercise of this freedom - freedom which ensues in creativity of the good, fight against evil, overcoming of the enslaving passions, responding in Eucharistic thanksgiving to the Creator.

Any understanding of 'nature' must then take into account these three elements:

- a) Man's participation in 'nature' as integral to it;
- b) man's representation of 'nature' as its priest, so to speak; and
- c) man's transformation of 'nature' to conform it to the good.

#### 4. God and the Universe

The relation between God and the Universe cannot be grasped conceptually, so long as one of the two terms - God - eludes the conceptual grasp. The tradition insists, however, that God is neither "beyond the universe", nor "contained in it". Not contained, for that which is contained would be finite; not beyond, for then there would be a boundary between God and the Universe, which would make both God and Universe finite since bounded.

Gregory of Nyssa holds to the following principles regarding the God-Universe relation.

- a) The universe subsists on and participates in God's energeia, but its is-ness is not of the same order as God's is-ness, and therefore the relationship cannot be defined in terms of any relationship we know - which is always the relationship of two entities with our kind of is-ness.

b) From our side there is a diastema or gap between the Universe and God, but from God's side there is none. The gap is experienced by us in many ways. One of them is that the rational understanding can travel through the sequential chain of the inter-connected cosmos, but never to the is-ness of the One on whom it is contingent. Rational knowledge does not get outside the created universe.

c) The question about God's existence is meaningless, since every created is-ness is contingent upon the uncreated is-ness of God. Nothing is, except in contingent relation to God's is-ness.

d) Even the question whether God and the world are two realities is pointless. This does not mean that God is the same as the universe. But it does mean that God is not "outside" or "beyond" the universe, which would logically mean that the universe is outside God, which means that God has a boundary with an inside and outside. If God and world were two realities then God plus world would be more than God. There cannot be anything like God plus something else. Hence we must abandon the notion that God and world are two realities.

## 5. Practical Implications

(1) 'Nature' terminology is misleading, since it separates Man from the rest of the universe, attributing transcendent value only to Man and not to the universe. This terminology is better abandoned. 'Creation' is the Christian word. If a secular word is needed, it is best to use 'universe'.

(2) Man does not exist apart from the universe, nor does the universe as known by science exist apart from Man. Humanity and the universe are interlocked parts of a single system. That system cannot be made into an object without distortion. It is more like humanity's body, not like an object outside humanity.

(3) Man deals with this universe in not one way, but several ways. Science-technology offers one way, but this way is by no means exhaustive. Three ways can be envisaged:

- a) Dealing with it for the creation of the good through understanding and manipulation, but without idolizing it or being totally absorbed by it;
- b) caring for it as one cares for the body, or as a priest cares for his people, and developing it; and
- c) dealing with it through symbol and ritual to transcend it and to relate oneself to the mystery of the Creator whose energy constitute it.

(4) These three ways are complementary and not exclusive of each other. All three are necessary. Only a combination of the three can make us fully human. Even the Antonine monks in the Egyptian desert knew it. They combined working with their hands (weaving baskets, usually), caring for the animals, and sacramental worship. Human culture must also provide for all three approaches to 'nature'.

## EDITOR'S NOTE

### NUCLEAR ENERGY IN INDIA TODAY.

India has already made the choice to "go nuclear" in the matter of energy for peaceful uses. Who made this <sup>decision?</sup> ~~discussion?~~ Did the general public know what the implications were? We operate today four nuclear reactors, including one experimental Test Breeder Reactor. The intelligent public probably knows that there were some disputes between Our Government and the U.S. Government about fuel for the reactors, but what the particular problems of Breeder Reactors are, very few of our people know.

Among countries committed to the peaceful use of nuclear energy, we could list the following countries in the Two-third world:

Latin America	: Argentina, Brazil, Cuba and Mexico (4)
Africa	: Nigeria and South Africa (2)
Asia	: China, India, Indonesia, Japan, Pakistan Philippines, South Korea, Taiwan, Thailand (9)
Middle East	: Egypt, Iran, Israel, Libya and Turkey (5)

There may be others. But these 20 countries are known to have taken the first steps for building nuclear reactors for the production of energy for peaceful purposes.

While in Latin America, only Argentina is known to have an operating commercial reactor. Brazil will soon have one or more. In Africa no reactors are known to be operating. Only South Africa has an enrichment plant for nuclear fuel and known Uranium reserves. Her capacity to produce nuclear energy for peaceful or other uses need not be doubted.

In Asia, China has an unknown number of reactors now operating - perhaps more than half a dozen. India has 4, while Japan has 13, Pakistan has 1, South Korea started one in November 1977 and Taiwan in the Autumn of 1977.

It seems to process is thus irreversible and in India, reversing the process and going back on the decision to go nuclear would be near impossible. What can still be decided are the following points:

1. What shall be our energy mix in 1990 or 2000 AD? In other words, in what proportion do we combine, in our planning and targetting energy sources like coal, natural gas, oil (and other fossil fuels), hydro-electric energy, nuclear energy, and other sources like solar, wind and wave geo-thermal, bio-gas etc. This decision has to be made in the light of our estimates of energy needs, the availability of fossil and hydro-electric energy, and our possibilities of developing alternate renewable sources.

2. What is going to be the proportion between Light Water Reactors (LWR's) which have to be continually supplied with new supplies of nuclear fuel, and Liquid Metal Fast Breeder Reactors (LMFBR's) that require only the initial fuel which can then be reprocessed and re-used. This question has to be settled on the basis of other questions like how much Uranium or Thorium would be available to us, and what is our assessment of the magnitude of risks in developing LMFBR's on an extensive scale.

Some would argue that the technology of LMFBR is still not sufficiently developed to reduce the risk to a manageable level. The main hazards are

- a) fuel waste disposal risk
- b) problems of highjacking, pilferage or robbery of fuel by private group or individuals and their irresponsible use.
- c) Reactor or Reprocessing accidents
- d) The need for greater policing and the consequent erosion of democratic freedoms.

Technical opinions vary on the magnitude and manageability of these risks. The general public, at least in western countries, is becoming

more and more reluctant to leave the decision to technical experts on matters involving not only the welfare of all people now living but also the kind of world we will be creating for future generations.

All this gives rise to a few fundamental ethical issues which need to be debated by the general public in India.

1. The most fundamental issues today can be stated thus. When a Government argues that the energy needs of the future cannot be met by fossil fuels and hydro-electric power alone, and therefore that nuclear energy has to be developed, the basic assumption is that industrial development is to continue at the present pace or faster in all societies. The anti-nuclear agitators are questioning this assumption. They argue that the pace of industrial development can be slowed down in the advanced countries; in fact it should be slowed down, not only in the interests of protecting the environment and conserving the finite resources of our planet, but also for the sake of developing a society which is not dominated by technical experts and security guards who invade our privacy, intringe upon our basic freedoms, and take away the power of decision from the people.

2. Closely related is the question of decision-making processes in our so-called democratic societies, who made the decision in India to start LWR's and an experimental Test Breeder Reactor? Did the general public know how momentous the decision was and to what incalculable risks the Government was exposing the general public in taking such a decision? Have the media been responsible in alerting the public to the implications of these decisions? Who are the true watchdogs in our society who represent the interests of the common man? Whom should the general public trust in these matters? Can we leave it to the experts and the politicians? On what basis could the Government have come to such a decision? Was it a question of prestige, of not being left behind in the technological race? One should be fair here and state also that to be left behind in the technological race is to expose ourselves to more complex patterns



of dependence and domination. To be behind in technology is often to be at the mercy of those who are further advanced. But is that the only consideration for decision-making?

3. When one argues that alternative sources of energy are not commercially viable, this means only that they are not so now. With sufficient planning and research investment, commercially viable technologies could be developed. Should we wait till the west develops a cheap photo-voltaic cell (a device to generate electricity from sunlight)? At the moment it would cost more than a hundred rupees to produce one kilowatt of electric energy by photovoltaic cell. But with sufficient technological innovation and research, we should be able to produce ~~this~~ photovoltaic electricity at a cost of Rs. 5/- per kilowatt. Why are we not spending more money on such research?

4. In computing production costs of energy, we generally fail to take into account the social costs. What dollars computation is possible for assessing the social costs in taking a risk to expose future generations to nuclear radiation from disposed waste fuel. The half-life (or period of dangerous radiation) of used fuel is now assessed as 50,000 years. That means exposing future generations to unknown risks up to 52,000 AD!.

How can we compute the social cost of people ~~having~~ to live in a state where the Government would have to be constantly ~~pry~~ prying into the private lives of people working in nuclear establishments, in political groups etc. to check whether plans are being hatched to high-jack or pilfer or rob nuclear fuel for subversive or terrorist purposes?

5. How can we compute the social cost of the nuclear option in terms of using the fuel for weapons purposes by Government themselves. The Governments who are now developing nuclear reactors for ~~it~~ non-military energy needs can use the same research, technology and fuel

for developing weapons. Today we have five nations which have already nuclear arsenals - U.S.A., U.S.S.R., Britain, France and China. India has exploded one test device already. At least the following nations have now nuclear weapons capacity: W.Germany, Czechoslovakia, Canada, Sweden, Spain, Switzerland, Argentina, Brazil, Japan, Pakistan, Israel, Iran, South Africa. There may be others. Israel and South Africa are reported to have nuclear weapons ready for assembly for some time now. Would not the general dissemination of peace-ful nuclear technology lead to inevitable nuclear weapons proliferation, thus making the world increasingly insecure for all human beings? This may be the unexpressed justification for the International Atomic Energy Agency showing little interest in the second half of its mandate, namely to help nations ~~give~~ gain access to nuclear technology for peaceful uses, while spending all its energy on preventing horizontal non-probiferation of nuclear weapons. The two halves of its mandate seem to be incompatible - on the one hand to prevent probiferation of nuclear weapons and on the other to promote the dissemination of nuclear technology for peaceful uses.

6. Those who fight for a non-nuclear option are mainly in the industrialized market economy countries. In these countries the pattern of industrialization and urbanization has entailed large-scale dehumanization and alienation, including disintegration of human values and institutions. Their protest, it seems, is directed more against the pattern of economic and social organization which they regard as integral to industrial development of the kind their countries have chosen. The development of nuclear energy would thus promote and accelerate the wrong pattern of social and economic organization. For us in India where the anti-nuclear protest is practically non-existent, we should ask two questions:

a) Has industrial development in the advanced socialist countries led to the same kind of dehumanization and alienation? Or is there another kind of dehumanization and alienation that is integral to a socialist industrial development? Do we have to or shift from one to the other? What are the advantages and disadvantages?

b) Is there a Gandhian or other socialist pattern of industrial development which would not lead to such dehumanization, and can such a pattern be implemented in our country.

7. The fight against the peaceful use of nuclear energy in the west is not accompanied by a similarly intense campaign to eliminate nuclear weapons from the face of the earth. Should not the two go hand in hand? Why does not the Gandhian movement in India result in a passionate anti-nuclear movement, in the realms of both military and peaceful uses of nuclear energy?

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Public debate in India, it seems should focus on the following major questions:

1. Have we made an irrevocable choice for the present pattern of industrial development, or are there alternatives still open to us in India? Is there a pattern of economic organization and consumption which would require less energy, and which would not entail a continuously growing need for ever greater and greater volumes of energy?

2. In this connection have we made a fundamental distinction between need and demand in economic terms? Does Government have a responsibility to orient the market demand in the direction of genuine human need, rather than the demand that is generated by quest of prestige, ~~by~~ by human cupidity, by desire for conspicuous consumption, and by promotion efforts of major industries to create artificial demand? If ~~there~~ the forces of the market are not allowed to determine demand, how does Government and the public make sure that demand is more conelated to genuine human need? Can need be fixed by public discussion?

3. What are the risks involved in large scale nuclear energy exploitation, in terms of

- a) environmental pollution
- b) radiation hazards
- c) social consequences of the need for greater fuel security.

4. In the light of our assessment of these risks, how strong is the case for

a) not being satisfied with Light Water Reactors and going for Liquid Metal Fast Breeder Reactors?

b) not slowing down on LMFBR development and waiting till some more experience is accumulated here as well as elsewhere in the world from existing Breeder Reactors? Why not a ten-year moratorium on the development of a commercial Breeder Reactor in India?

5. Hazards of waste disposal are of such magnitude that it may be safer to entrust such disposal to some international agency over which we have some control.

6. Should we ban the plutonium economy in our country and more resolutely develop the Thorium Cycle (Thorium to  $U^{233}$ ) in preference to the enriched natural uranium cycle which seems comparatively less hazardous. We have located only limited Uranium deposits but have large-scale monazite or Thorium deposits. The west has developed the Uranium line precisely because the known monazite sands at the time of the first Atomic Energy Conference was held in 1955 were not in western-controlled lands, whereas Uranium deposits were available in North America, Soviet Union, Australia and Southern Africa (including Namibia). If we follow the Thorium line we can be less dependent on the advanced industrial countries for our fuel supply, and may even be able to reduce the number of Fast Breeder Reactors.

7. In assessing the hazards can we examine the two related questi

a) low level radiations below the commonly accepted threshold may still be hazardous in the long run in terms of cancer generation. Even excessive use of the common X-ray seems to be carcinogenic. Do we have enough data to assess the long-term effects of low level radiation generated by any kind of nuclear reactor?

b) how economic is the input-output ratio in nuclear power generation? Some say it is not very high.

Some New Testament Foundations for a  
Respectful Approach to The Created Order

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(Paulos Mar Gregorios)

The other day I was privileged to be present at a special function at our Indian Presidential Palace, where President Zail Singh was bestowing a privately endowed honour on one of our most creative friends of nature - Sunderlal Bahuguna. Bahuguna is well known and written about, both in India and abroad. He initiated the Chipko Movement, which has been an important factor in the awakening of Indian consciousness on the environment question, particularly in the conservation of forest trees in the Himalayan region. Many of you have read or otherwise heard about the mindless and tragic denudation of the Himalayan forests by thoughtless cutting of trees by the government, resulting in heavy soil erosion, desertification and climate change. Sunderlal Bahuguna, after having tried many ways of stopping the government, finally launched the "Embrace (chipko) the Trees" movement.

He trained the village people to go and embrace a tree as the government workers come to cut it down. The people understood and took on the concerns of the movement with enthusiasm. Government, at the highest levels, had to make some big decisions to reduce the cutting of trees which would have been politically impossible without the Chipko movement.

Sunderlal Bahuguna, the author of the movement, is a simple Gandhian. He said, publicly, that even in the green lawns of the Presidential Palace he was ill at ease. He wanted to be back among the forest trees and the mountain people. He very reluctantly accepted the award, and expressed happiness that in that process the movement was being recognized.

In his acceptance speech, Bahuguna made three points which stick in my mind. He is a Hindu, I am a Christian. He is a Hindu. He gave us three principles for the environmental movement. I will put down what he said in Hindi in my own words in English:

1. Nature is to be worshipped, not exploited;
2. One who takes less from nature and society should receive  
who takes more:

3. There is a richer world inside one, which is more worthy of cultivation than the outside world.

As a Christian I have to reflect on these principles further. I cannot accept them at face value. And it is in this context that I seek, trusting in the grace of God and in the power of the Holy Spirit, to examine three passages from the Scriptures of the New Testament, in order to frame my own principles for the environmental movement.

Let me first present to you my own version of the three passages, and then make some comments on them:

1

St. Paul to the Romans 8:18-25

For I regard the troubles that befall us in this present time as trivial when compared with the magnificent goodness of God that is to be manifested in us. For the created order awaits, with eager longing, with neck outstretched, the full manifestation of the children of God. The futility or emptiness to which the created order is now subject, is not something intrinsic to it. The creator made the creation contingent, in his ordering, upon hope; for the creation itself has something to look forward to - namely, to be freed from its present enslavement to dis-integration; the creation itself is to share in the freedom, in the glorious and undying goodness, of the children of God. For we know how the whole creation up till now groans together in agony, in a common pain. And not just the non-human created order; even we ourselves as Christians, who have received the advance gift of the Holy Spirit, are now groaning within ourselves; for we are also waiting - waiting for the transformation of our bodies and for the full experiencing of our adoption to the status of God's children. For it is by that waiting with hope that we are being saved today. We do not hope for something which we already see. Once one sees something, there is no point in going on hoping to see it. It is there. What we hope for is what we have not yet seen; awaiting its manifestation, in patient endurance".

He, Christ, the Beloved Son, is the manifest presence (icon) of the unmanifest God. He is the Elder Brother of all things created, for it was by him and in him that all things were created, whether here on earth in the sensible world or in the world beyond the horizon of our senses which we call heaven; even institutions like royal thrones, Seats of lords and rulers; all forms of authority. All things were created through him, by him, in him. But he himself is before all things; in him they consist and subsist; he is the head of the body, the Church.

He is the New Beginning, the First-born from the dead; this way he becomes in all respects pre-eminent. For it was (God's) good pleasure that in Christ all fullness should dwell; it is through him and in him that all things are to be reconciled and re-harmonised. For he has removed the contradiction and made peace by his own blood. So all things in the visible earth and in the invisible heaven, should dwell together in him. That includes you, who were once alienated, enemies in your own minds to God's purposes; immersed in ~~evil~~ evil actions; but now you are bodily reconciled in his fleshly body which has tasted death. Christ intends to present you, holy, spotless and blameless, in God's presence, if you remain firm in the faith, rooted and grounded in him, unswerving from the hope of the good news you have heard; the good news declared not only to men and women on earth, but to all created beings under heaven. It is this gospel, that I Paul, have also been called to serve."

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Gospel according to St. John 1:1-5

At the source-spring of all, the Logos is and was. The Logos is God's presence, and the Logos is God. It is this Logos that in the beginning was face to face with God. It is through the Logos that all existents have come to exist. Without him not a single thing could come into being. In him was also life. Life is light in



I want, as a Christian, to draw my own three principles for a more respectful approach to the created order. At the end we shall compare our principles with Sunderlal Bahuguna's.

.1.

1. Human redemption can be understood only as an integral part of the redemption of the whole creation.

We have been conditioned, for a long time now, to understand the redemption in Christ, in terms primarily and too often exclusively of personal salvation. A basic requirement for a healthy Christian approach to the human environment seems to be a shift of gears in this regard.

What is a "person" whose salvation Christ effects ? A person exists only in relation - in relation to other human persons (father-mother to begin with) and to non-human realities (light, air, water, food etc). It is not possible for a human person to come to be or to grow without relation to other persons and things. The earth and the sun as well as other people are an essential part of my existence. Without them I cannot exist.

Both the Pauline and the Johannine witnesses in the New Testament strongly affirm this redemption of the whole creation - cosmic redemption, if you like, or the participation all creation in the liberation of humanity from the bondage to sin and death.

This is in strong contradiction to the Gnostic-Hellenic-Hindu notion which is most characteristicall expressed by Plotinus, the so-called founder of so-called Neoplatonism in the third century:

"No, if body is the cause of Evil, then there is no escape; the cause of Evil is Matter" (Enneads 1:8:8)

"This, it is quite correct to say at once that Matter is without Quality (in itself) and that it is evil;; it is evil not in the sense of having Quality, but precisely, in not having it" (Enneads 1:8:10)

The body is, in this tradition, the source of bondage and evil. Unfortunately this tradition is very strong among Christians also, who like Hellenists, Hindus and Neo-platonists, believe that the soul ~~as~~ alone is to be saved, and that the body or other material objects, whether living or non-living do not participate in or benefit from the redemption in Christ.

This gnostic influence in Christianity is what has pervaded our understanding of the Old and the New Testaments. Why do we magnify the prophetic and under-play the priestly in the Old Testament? Is it not the case that the Old Testament gives just as much, if not more, prominence to the priestly as to the prophetic? We prefer the prophetic because it fits better with our gnostic temperament which despises the material and the corporate, the sacrificial and the ritual, and ~~prefers~~<sup>prefers</sup> the individual soul and the prophetic word as our focus of attention. I will come back to this point later, but here we need affirm only what St. Paul and St. John so strongly affirm, contrary to the Gnostic-Hellenic-Hindu tradition, and in the true spirit of the Old Testament, that the whole creation and not just a few human souls, has been redeemed and reconciled in Christ.

Human beings have existed, and do exist, only as integral parts of a system which includes Sun and earth, light and water, air and fire, as well as wheat and potatoes, meat and vegetables. To make a false distinction between "nature" and history, and to limit the presence and action of God to history, and to deny God's action in "nature", cannot be regarded as Christian.

Neither "nature" nor "history" in our sense are biblical notions. Nature or phusis in Greek, in the sense of non-human self-existent reality, does not occur in the Old or New Testament and is a notion alien to the Biblical world. In so far as the word 'nature' refers to something as it exists by itself it is contrary to the Johannine affirmation that not a thing came into being without Christ the Logos. If the Old Testament uses the word 'nature', it is only in the book of Maccabees, and puts the word in the mouth of a Greek (Antiochus) rather than of a Hebrew. (on this, see my Human Presence p. 20ff) In fact there is no Hebrew word for nature. Hebrew can create (bara') as a verb, but it seldom uses

the whole creation

The Old Testament may make all the trees of the wood rejoice (Ps 96:12), or ask the trees and animals to praise the Lord (Ps 148), but it does not speak about 'nature' or the "creation" as an entity representing the whole created Order.

The O.T. does not have a notion of 'history' either, as a realm apart from nature. The New Testament also does not speak of 'nature' as the ensemble of created entities. If it uses the word nature (in expressions like phusis, phusikos, kata phusin), it is to distinguish between natural and unnatural or natural and artificial, (see Rom 1:26,27; 2:27, 11: 21,24) or to speak about what is spontaneous or connatural. It can speak of our being partakers of the divine nature (theias koinōnoi phuseōs - 2 Pet 1:4 literally means "sharers in the nature of the Godhead"), but not of any nature existing independently of God.

Neither is the noun 'history' (Gk historia from historeo = to see, visit, enquire or learn by enquiry) a common biblical notion. Certainly, the Bible does not know a God who acts in 'history' but does not act in 'nature'. A historia is a carefully researched narrative of a series of events, not a realm of exclusively human or divine action, unrelated to nature. The noun history does not occur in the Hebrew or Greek Scriptures, and when the verb occurs once (Gal 1:18) it means visiting someone (to visit Cephas)

We have so distorted the Biblical perspective on redemption by introducing alien categories like 'nature' and 'history' into it, or by understanding redemption in terms of souls and persons only. Liberalism and neo-Orthodoxy, in reacting against the exclusive emphasis on personal salvation, fell into the trap of false categories like God acting in history but not in nature, or of 'history' rather than 'nature' as the realm of God's revelation. This can be traced to a Gnostic bias which detests nature and sacrament as material, but can see 'history' and 'word' as somehow non-material and (therefore ?) spiritual.

A new understanding of the Redemption in Jesus Christ will then have to take into account at least the following integral relations:

- (a) Personal and Corporate salvation;
- (b) spiritual reality and material reality in the creation and in the Incarnation;
- (c) the Created order as the object and field of the redeeming order;
- and (d) the human person as integrally related to the whole cosmos

Once these relations are kept in mind, we will have a picture of our own faith which will facilitate a more respectful approach, not to 'nature', but to the created order as a whole. The continuity between the order of creation and the order of redemption, rather than their distinction and difference, should be the focus of our interest. Man is redeemed, with the created order, not from it.

## II

Second Principle : Christ himself should be seen in his three relational dimensions, each of which is related to each other:  
(a) to members incorporated into his body; (b) to the human race, and (c) to the other than human orders of created existence in a many-planed universe.

Such a Christology will not conceive of a Christ as somehow other than the Created order. Now much of Christology sees Christ and the World, Christ and Culture, as two separate entities; ~~and~~ we try to affirm the Lordship of Christ over world and culture, by conceiving even the incarnate Christ as somehow totally distinct from the Created Order. We then think of him as Lord of the World, Lord of the Church etc. Or else, in the more individualistic versions of Christology-soteriology, some make him "sole mediator" between me and God. The perception is in terms of three realities - God-Christ-Me. God is there, I am here, and Christ stands in between. And the world or the Church are fourth and fifth realities.

This kind of disjunctive thinking has to give place to an integral and participative way of understanding Christ. Jesus Christ is not an abstract or 'purely spiritual' entity.

He is incarnate. He took a material body. He has become part of the created order, while remaining unchanged as one of the three persons in the Trinity who is Creator. He is one of us. He is fully consubstantial with us.

(a) We are united with him, as Christians, in a specially intimate way. By baptism and by faith, he has incorporated us to be members of his body. By participation in his body and blood, we grow to be integral parts of him. Once he had a human body like ours. He still has a human body - it has already, however, become a transformed and resurrected body, not subject to the ordinary laws of our physics, which govern only mortal bodies and material objects. But he has chosen to have a larger body, partly in heaven (i.e. beyond the horizon of our senses) and partly here on earth. We belong to that body as a whole, but particularly to the earthly part of it. Christ always exists with his body, <sup>also</sup> when he continues to fulfil his ministry as high priest of Creation and as prophet and servant of the world. *Our faithfulness or otherwise affects the whole of humanity & the whole cosmos.*

(b) But Christ Incarnate is a human being - consubstantial with all other human beings. He did not become <sup>being</sup> simply an individual human person nor a Christian. He became ~~man~~ male and female. The whole of human nature has been assumed by him, and there is now no humanity other than the one which Christ took - our humanity in which all human beings participate, whether they believe in Christ or not, whether they recognize the nature of their humanity or not. This aspect of the Redeemer's relationship to the whole of humanity, independent of human faith, is seldom fully recognized by Christians and its implications worked out. No human being is alien to Christ, whether he be Christian, Hindu, Muslim, Communist or Buddhist. They share in Christ's humanity in ways that we have to spell out elsewhere. They are not members of the Body of Christ, but they are not unrelated to Christ. *And since Christ assumed humanity and loves humankind, the Church can do no other*

(c) But Christ the Incarnate One assumed flesh - organic, material, physical human flesh; was nurtured by air and water, vegetables and meat, like the rest of us. He took matter into himself. Matter is not alien to him now. His body is a material body, transformed, of course, but transformed matter. He shares his being thus with the whole created order - animals and plants, snakes and worms, flowers and seeds. All parts of creation are now reconciled to Christ. And the created order is to be set free and to share in the glorious freedom of the children of God. Sun and moon, planets and

are to participate in that final consummation of the redemption.  
*After humanity fell, and the universe has fallen. Death rules not only in human-  
but in the whole of its realm*

The Risen Christ is thus active now, by the Spirit, in all three realms: in the Church, in humanity as a whole, and in the cosmos as a whole. The relationships at the three levels are fundamentally different, but they are real and meaningful relations to Christ the Incarnate One.

Our theology's weakness has been in the failure to recognize the wider scope of the redemption beyond the "individual soul" or the person. Liberalism still spiritualises the incarnate Christ by confining his actions to so-called 'history' as if that were a realm in which 'nature' or the material elements of creation were not present.

We have to move beyond personal salvation to declare and teach the three basic dimensions of the redemption: in the community of faith, in humanity at large, and in the cosmos as a whole.

### III

#### Third Principle.

Christ and the Holy Spirit are related to the whole Created Order in three ways: by creating it, by redeeming it, and by finally fulfilling it in the last great consummation.

There is no need to elaborate these points. The act of creation is a corporate act of the three persons of the Trinity. God's relation to plants and trees, to air and water, did not begin with the Redemption in the Incarnate Christ. There is not a thing now existing which ~~did not~~ come into being without Christ and the Holy Spirit, including the primeval water over which the Spirit was hovering at the time of creation (Genesis 1:2). Neither art nor literature, neither mountain nor river, neither flower nor bacteria, came into existence without Christ and the Holy Spirit. They now exist, because they are sustained in existence by God. The creative energy of God is the true being of all that is. Matter is Spirit or energy in the form of mass. We should regard our human environment therefore as the energy of God in a form that

We have already discussed the relations of the human environment, of the whole cosmos to the redemption. It is a redeemed cosmos that we meet in our environment, and it is worthy of respect as such.

It is the final apokatastasis, the fulfilment at the end that still needs to be stressed. The consummation, which St. Paul calls anakephalaiosis means adding up (Eph 1:10) everything i.e. the consummation of the whole created order in Christ. Take the three numbers 5, 7 and 14. When one adds them up one gets 26. At first sight it may not be obvious that the three numbers are contained in the larger number; but they are there; by they are not lost. There is a process analogous to this in the final apokatastasis, about which St. Peter preached in Solomon's Portico in Jerusalem. "Christ Jesus, whom the unseen realm must keep until the times of the final restitution of all things, about which God spoke through the months of his holiness<sup>ness</sup> the prophets from ages ago", (Acts 3:21)

In the Christian understanding the status of the world, of all life and of inorganic matter, is determined by the three factors:

(a) How did they come to be and how are they sustained ?  
(answer-by creation)

(b) How does the Incarnation of Jesus Christ affect them ? ( answer: they share in the destined freedom of the children of God)

and (c) What is their final destiny ? (answer: to be incorporated, through transformation, in the new order which fully emerges only at the end, in the final recapitulation. The whole created order comes from God the Holy Trinity, is redeemed by the Incarnate Christ, and will be brought to fulfilment after transformation, by the same Christ and by the Holy Spirit the perfecter of all.

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Once these Christian teachings are fully assimilated, we are in a position to look again at Sunderlal Bahugunas three proposals.

Christians cannot say that nature is to be worshipped and not exploited. Christians would say that the created order (not nature) is to be respected as the order which has given birth to us, sustains us, and will be still the frame work for our existence when the whole process of creation-redemption has been consummated. We respect it, both because it comes from God and is sustained by him, and also because it is the matrix of our origin, growth and fulfilment as human beings. We do not worship the creation. Worship is reserved for the Creator. We have to tend the creation, using it for our own sustenance and flourishing, but also to respect it in itself as a manifestation of God's creative energy and to co-operate with God in bringing out the full splendor of the created order as reflecting the glory of the Creator.

As for Bahuguna's second principle that one who takes less from nature <sup>and society</sup> is to be mere honoured <sup>an</sup> than one who takes more, this seems also doubtful for Christians. Simplicity of life is a high value, but enforced poverty is not. And the poor are to be respected, not because they take less from nature but because they are the friends of God and victims of injustice. Both are options for Christians - the simple life a la John the Baptist, who lived on locusts and wild honey in the desert, and the normal life of our Lord who prayed all night and worked all day, but ate and drank with others to the point where he was called a glutton and a wine-bibber. Neither of these life-styles would, however, justify the mindless affluence of our consumer society. To impose austerity on a society may be <sup>unwise</sup> ~~unwise~~; but it is even more <sup>unwise</sup> ~~unwise~~ to impose affluence on a nation through hidden persuasion, in order to make some people more affluent than others. In taking ~~to~~ what is given by "nature", we should be careful to give back to "nature" what it needs for its own integrity and for the needs of the future.

Finally, about the ~~inner~~ universe which awaits care and development, Christians need not ~~despise~~ or reject the outer world in order to develop the inner world. And we should not, as Christians, think of the inner world as an individual realm. We speak rather of the ~~unseen~~, of the heavenly, of that which lies beyond our senses. It is a different perception, as for example <sup>when</sup> St. Paul says:



"If then you have ~~So~~-risen with Christ,  
seek the higher things, where Christ now is,  
enthroned at the right hand of God. ~~Meditat~~  
Meditate and will the heavenly realities, not  
the earthly ones" (Col. 3:1-2)

We don't speak of the inner world, but of the final fulfilment  
which is already present in the realm beyond our senses, and  
which moves our world as its norm and goal now. Even when  
thinking about the environment or socio-economic and political  
life - ta ano phroneite ; focus your mind and will on the  
higher realities (not the inner) which must be manifested in  
the earthly realities; now partially, but in the end fully.

## THE SILENT VALLEY SCHEME

### Some Arguments and Some Reflections.

(Paul Gregorios)

The controversy about the Silent Valley Hydro-electric Project entails several issues - economic, environmental and human.

#### The economic approach.

Power shortage is one of the biggest problems of India, which grows more and more acute every year. We in India consume only about 3% or less than 1/30th as much energy as the Japanese do, on a per capita basis. Our per capita electrical energy consumption in a year is about 80 KWH (Taiwan - 583 KWH, Israel 1740 KWH). We have 15% of the world's population; we consume 1.5% of the world production of energy. That means we will have to produce 10 times as much in order to become an average consumer. In the ladder of per capita consumption of energy India stands 113th among 150 nations. About 8 affluent countries together produce and consume 50% of the world's energy.

This means clearly that we must use every possible source of energy, if we are to make progress in Industrial Development, and begin to solve our national problem of poverty. In terms of potential resources of Hydro-electric power, we are well endowed with mountains and rivers - not far behind the U.S.A. and the USSR. There is high potential in Panjab, Haryana, U.P., Maharashtra, Tamil Nadu and Kerala. The Central Water and Power Commission has identified some 260 potential sites for hydro-electric power development in India. Our total potential has been estimated as 25 million kilowatt continuously, i.e. when fully exploited, 21,631 million kwh per year.

In 1947 on the eve of independence our installed capacity was 0.5 million kw. By 1975 it grew to 7.52 million kw, with 77 major hydro-electric plants. Today we are on the way to the ~~million~~ 10 million kw installed capacity, which is 40% of our potential. We need more power. The Silent Valley\* Hydro-electric scheme was projected already as early as 1920. The technical investigation was carried out in 1958; it was considered by the Kerala State Electricity Board only in the 1970's.

The Valley is located in Palghat district, 45 kilometres north of Mannarkat, on the banks of Kuntipuzha which is a tributary of Bharatapuzha. It is ~~only~~ one of the largest waterheads in Kerala. The four districts of North Malabar, i.e. Cannanoor, Kozhikode, Malappuram and Palghat are comparatively under-developed and need power for its development. 1988-89 requirements are now estimated at 5100 million kwh a year. Silent Valley can provide about 1000 million units. The total hydro-potential of the 4 districts is estimated at 2500 million units. Not to develop Silent Valley as a Hydel Project is to neglect seriously the development of the four northern districts of Kerala.

If the power supply position in India were better, and the national grid fully in effect, we could extend the 220 kv line that now supplies power from Idukki to Karnataka, to extend to the four northern districts also, or these districts could be fed directly from the Karnataka terminals on the grid. But our national power position is not so good. We need to tap every available source of power. The development of Silent Valley will give employment to many in a State where unemployment is a key problem. It will develop the four northern districts of Malabar which economically now lag behind the rest of Kerala. The Silent Valley is thus a partial solution to the problem of regional imbalance and inter-regional injustice within the State.

\* It is called Silent Valley

I am sure that I have not adequately summarized the economic argument for Silent Valley. I would be grateful to find out about supplementary arguments.

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### The Ecological Argument.

The ecological argument goes exactly contrary to the economic argument summarized above. It has two aspects - the climatological, and the conservational. If you want the original arguments, you can write to Dr. S.S. Nari of the Kerala Natural History Society (C/o Dr. C.J. Chandra, Veterinary Officer, The Zoo, Trivandrum-695 001) or to the Secretary of K.N.H.S. in Calicut (Science Centre, Annie Hall Road, Calicut - 673 002).

Silent Valley is a tropical rain forest, evergreen, marked by lofty broad-leaved trees, with some 100 inches of annual rainfall. The green leaves touch each other and provide a continuous green Canopy for the forest. The temperature is usually in the 80's. So is the humidity about 80%. Sunlight does not reach the forest floor. So there is little undergrowth. The trees are very tall, well buttressed; most of the growth of leaf and flower and fruit is confined to the very top where sunlight is plentiful.

It was a Virgin forest till recently - some 8000 hectares or 80 square kilometres, at an altitude of 120 metres to 880 metres on the East Slopes, some 2300 metres high on the north end. There are higher slopes without trees, with only exposed grasslands.

There are reports that 23 species of plants there are unique - not found elsewhere in the world. Four species of rare mammals are already endangered by the incursion of humans into their habitat\*-16 species of hill-stream fishes have been identified so far unknown to science. I cannot personally vouch for these figures and they have been disputed. There are said to be large eels, lizard a flying snake and a number of limbless amphibians.

The Archeological Department says that the Valley has never at any time been inhabited by humans (until the recent Adivasi incursion). If this is true, we have one of the few areas in the world where biological evolution has proceeded without human interference for 50 million years and constitutes one of the few remaining laboratories for the study of biological evolution.

Special interest has been expressed in the Lion-tailed Monkey (simhalakarangu) which dwells on the tops of the tall trees. Reports say that this species is very rare, and a key to the study of the evolution of human beings from other primates. It is believed that humans evolved from a species of high arboreal mammals who had certain social habits which led to their evolution.

They say that there are less than 500 lion-tailed monkeys in the world, and that half of them are in the Silent Valley. According to these Natural History experts, the world had about 1000 of them in 1961-63, and their world population dwindled to about 500 by 1975. The ones in the Silent Valley area inhabit the whole Valley as well as the Attapadi Reserve forests around Coimbatore in Tamil Nadu. They are divided into social groups, each social group having a territory of some 5 sq. kilometres of forest. The present community is estimated to live in some 26 groups - if so they need 13 sq. km. of forest (which is about what Attapadi plus Silent Valley covers to).

\* The Zoological Survey of India says three totally new species of hitherto unknown to man have been discovered in the forest

The lion-tailed monkey drinks from the Kuntipuzha and eats mullan-chacka or thorned Jack. If the area is flooded, most of the thorned Jack trees will be gone. Human habitation with domestic animals will bring new diseases to the area, against which the wild life may have no immunity.

Till recently the nearest road was 20 km away. But now approach roads have already been constructed. Adivasis have already migrated into the forest fringes. Poachers and hunters have also now free access. It is also remoured, perhaps without base, that some Kerala politicians have already occupied some of the newly cleared areas and started cultivating cardamoms and other cash crops. There is even the allegation that these are the real vested interests who blow up and promote the ecological argument against the Silent Valley Project. This is far from proved.

Of course the Valley has an area of some 90 sq. kilometres, or precisely, 8952 hectares. The project will occupy some 1022 hectares, of which about 950 hectares will be evergreen forests, and the flooded area would be some 770 hectares. But this is crucial for the whole forest, since the forest is a balanced organism with ~~mutually~~ mutually supports' life systems, in which if one factor is upset the whole may cease to function. Idukki was such a tropical rain forest, but it is getting ruined as a habitat for many animals which are now dying out.

The ecological argument is based on the assumption that:

- a) the project will destroy a unique ecological laboratory, extremely valuable to humanity in terms of scientific research and our care for rare species;
- b) the project will upset the climatological balance of the area;
- and c) the gain in terms of power and irrigation cannot be compared to the enormous loss which will be entailed by the factors (a) and (b)

Deforestation in the Silent Valley, they say will probably desertify the Palghat area. Palghat district is Kerala's driest, with the lowest rainfall rate. At the moment the green canopy of the project area of the Silent Valley is estimated as hundreds of square kilometres of leaf area. The reduction in the water-vapour transpired by these leaves cannot be compensated by the evaporation from the 8.30 sq. km. of the reservoir.

Denudation of forests for dam and civil works can cause de-stabilization of soils and the vegetative cover; this could lead to changes in the micro-climate and in surface and ground water flow patterns. These in turn could have serious adverse effects on the climate of Nilgiris and Coimbatore as well as Palghat district.

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## Conclusion

1. It is clear that only a group of reliable experts who have no vested interests of their own can finally tell us whether these are idle tales or exaggerations or largely true. The important thing is to commission such a group of disinterested but competent persons to check on the facts and report to the public.

2. While the expert group is working on ascertaining the facts, the public can discuss the following questions:

a) If there is a considerable risk of destroying the balance of the Silent Valley and creating climatological problems as well as substantial ecological loss, should we undertake the Hydro-electric project there?

b) What other form of compensation can be given to the northern districts for their development? - a nuclear reactor? Would that take care of the irrigational problems? What about the risks and hazards of nuclear reactors? Has there been a serious proposal for a nuclear reactor in Kerala? Have we studied the problems of nuclear reactors? Should we begin this discussion now already since the issue is bound to come up in any case in the next few years as possibilities of hydro-electric power and oil become exhausted?

The discussion on Silent Valley should thus broaden out to a deeper understanding of the environmental or ecological issue, as well as a wide-ranging study of alternate sources of energy and problems connected with them.

## SOLAR ENERGY IN INDIA TODAY

How Excited Should We Be ?

(Dr. Paul Grégorios)

Solar energy is plentiful in India. No one has as yet taken a monopoly on it. There is no tendency even to hoard it for profiteering, at least in India today.

But solar electricity is certainly not cheap. Our hydel projects and our hydro-carbon burning electricity projects are all inefficient, and therefore incredibly high in production costs and seldom reliable. But can solar electricity compete in the market with hydro-electric or hydro-carbon electric power ? Certainly not now.

Non-electrical use of solar energy seems more suited to air and water heating purposes, but this is a priority only in cooler climates than ours. Of course some of our ITDC hotels and other establishments can certainly use solar energy in larger quantities for air and water heating and I am glad that the Qutab Hotel has already done some pioneering in this regard. Maintenance problems will hit even Qutab in due course if they have not already done so. But we may, let us hope, learn to overcome these. It may also have some potential in industry where sub-sixty temperatures are needed for air or water.

The question today is, however, how to make solar or any other form of energy available to the poor ? I have no panacea for solving this problem. But I do have a few convictions that I would like to share.

1. The Priority of Wood Energy. I would submit that, planning on the national scale in India today should give a higher priority to wood fuel than to solar energy, if the needs of the poor are to receive due consideration. This does not call for any great technological innovations, and for that reason it may not appeal to the planners. If there was one thing on which Sanjay Gandhi was right, that was about the need to plant more trees. It is all right to talk about Solar and Bio-mass, but neither of these is very likely to come within the practicality and affordability range of the poor man, at least until solar photo-voltaic

What prevents solar from so coming is a good question, the needs to be answered. But in the immediate future wood energy in plentiful supply at economic rates seems to be the best way to meet the needs of the poor

The World Bank Report on Renewable Energy Sources in the Developing Countries (Jan, 1981) cites a review which states that "about 50 million hectares of trees would need to be planted in the developing countries between now and the year 2000, to satisfy the projected demand for fuelwood for cooking and heating in the year 2000". (p.24). This means a five-fold increase in present tree-planting rates - and in some areas like Africa a fifteen-fold increase. The World Bank thinks that this particular review is understanding the problem, being too optimistic about alternate forms of energy like biogas and kerosene becoming usable. The World Bank says then that it is planning only \$ 425 million loans for wood for the 5 year period 1981-85, which obviously will not meet the need - even if wood stoves become much more efficient and charcoal production techniques are improved.

The Bank estimated (in 1980) that they would have to increase their lending to more than twice their present plans, i.e. to lend \$ 1100 m for the 5 years 81-85, if the target is planting trees on one million hectares of land over that period. And the review estimates the need as fifty million hectares in 15 years !

But firewood prices are already sky-rocketing in India, and the poor certainly cannot afford to buy firewood at present market rates. Eric P. Richolm, in his article on "The Other Energy Crisis: Firewood" in Energy in the Developing World: The Real Energy Crisis<sup>x</sup> tells us in West Africa (Niger and Upper Volta) firewood takes 20% to 30% of the average family's income - at least those families which can afford to buy any firewood at all. In Pakistan, poor people strip the bark off the trees that line the roads. Poaching for firewood is on the increase everywhere.

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x Vaclav Smil and William E. Knowland (eds),  
Oxford University Press, 1980

For too many poor people in India, dung patties, the only available alternative to wood fuel, are also becoming increasingly beyond their reach; even if they were within reach, cowdung is rich fertilizer, and it is a huge waste of its plant nutrients to burn it as fuel. The estimate is that 300 to 400 million tonnes of wet dung is dried to give 60 to 80 million tons of dry dung patties. Perhaps the fertilizer so wasted is about a third of our present chemical fertilizer production ! The only solution is to plant more trees so that cowdung is returned to the soil - as nutrient and not as ash.

Excessive use of bio-gas can also be an unusual strain on the cowdung cycle, which has to be maintained for the fertility of rural land.

## 2. The Economic of Solar Energy.

There are very few forms in which direct solar energy can be used on a small scale, with collector focussing. The solar cooker is still a curiosity in India. They say you can make one for Rs 100 to Rs 350/-. And that is, even if it were true, more than what many poor can afford. Besides, for families where the cooking has to be done in the evening after the bread winners return from wage labour, solar cookers are no use any way. And maintenance is also more of a headache than what many poor homes can manage.

The economics of solar energy for the poor, however, is more than merely a matter of cost and maintenance. Is solar energy likely, in the near future, to help the poor at all ? If direct solar is to be used mainly for water and space heating, the Indian poor would not be interested. If cookers cannot be used when the sun is not shining, they are also going to be of little use to the poor. Photovoltaic conversion also seems now beyond their budgets. Despite all claims that photovoltaic costs have been or are being drastically reduced, in most cases solar energy, supposed to be free, remains more expensive than many traditional technologies.



— in the over-all economics of solar energy the only major factor is its renewable character. The supply is unlikely to run out. There will be no scarcity of the energy source itself.

Even for the privileged 40 % of our country above the poverty line, solar energy seems to have mainly ecological-educational value. In some of our northern climates, they may have some value for room and water heating purposes; but as far as I know, no simple technology has been developed for keeping a house air-conditioned - cool in hot weather and warm in cold weather. Middle class people do use hot water throughout the year, but solar heaters are still too technologically inelegant and economically unattractive.

Commercial use of solar energy also does not seem to offer much attraction. Of course solar energy is good for drying grains, fruits, vegetables, meat and fish, tobacco leaves etc; but whether they compare economically with alternate energies is still doubtful. Solar energy may be useful in places where electric energy is as yet unavailable, but this is only a short-term use.

### 3. Is Solar Energy worth the effort?

These observations lead to the question whether it is necessary or wise for the Government of India to invest large amounts today in Solar Energy research. I myself used to argue that if we had put the money and effort we have put since 1947 into nuclear energy, we might very well have been ahead of others in solar technologies. I do not so argue now. Our nuclear energy programme has been severely handicapped not only by factors of international politics, but also of infrastructure and of efficiency in management. Would our solar energy research programme have fared better? I doubt it.

Only on photovoltaic conversion technology I still retain a measure of hope that significant breakthroughs can be made. With the use of non-crystalline or amorphous silicon, costs may be considerably reduced; but we still see little chance of a reduction in flat-plate or reflector area. If it is going to continue to take about two square meters of photovoltaic cells to produce one kilowatt hour a day, any large scale commercial use of photovoltaic energy seems riddled with somewhat insuperable problems of space and raw materials.

I am told that the market price of PV cells has fallen, from about \$ 100/- per peak watt (under optimum conditions) in 1970, to about \$ 10/- by 1980. There is expectation of similar dramatic reductions in this decade, but I am not sure that those calculations have taken all the relevant factors into consideration.

The World Bank judgement in 1980 was that PV power will cost not less than 55 cents US<sup>x</sup> per kilowatt hour under optimum conditions. Small conventional generators now produce dependable electricity at about 45 U.S cents per Kwh., and in the U.S.A. diesel generator power costs about 18 cents per kwh or less. These prices will keep going up, but the same factors will also affect PV power. It is unrealistic to hope that PV can compete in the market with hydropower or oil power, at least for some years to come.

#### 4. Is Solar Energy ecologically problemless ?

The usual argument for solar is in terms of two environmental factors of great importance - depletion of resources and pollution of ecosphere. It is clear, however, that the harnessing of solar power requires the use of finite or non-renewable sources like collector materials or silicon. When solar power is used on massive scales, it may give rise to new shortage problems in non-renewable resources. Though not as serious as oil and gas depletion, it is still a problem, and the assumption that solar energy solves the problem of finite non-renewable energy sources may be pre-mature. The idea of earth-orbiting sun-tracking solar collectors with micro-wave transmission to earth stations remains still only an idea, but if it becomes realised, it may create quite considerable environmental problems.

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x. At present the costs under optimum conditions averages about \$ 2.00 per kwh.

But even if the comparatively harmless earth-based collectors are used, as the scale increases, we may find that it does create environmental problems of an unanticipated kind. It is naive to assume, before sufficient experience, that solar energy is ecologically problemless

## 5. Conclusion

There are certain specific areas in which solar energy can be used, but I have the feeling that some of these areas are not priority areas for India today. I shall try to list some of the areas where solar could be used, also in India, hoping that others would add to the list.

1. In certain remote areas, like unelectrified villages, solar powered generators and solar distillers, could both be useful, if maintenance problems can be handled;
2. For telecommunications repeater stations, satellites, rockets, navigational buoys and beacons, remote monitoring equipment, etc.
3. For solar flat-plate driers - fruit, tobacco, fish, grains, timber, meats and vegetables, in situations where natural solar drying is hindered.
4. For more efficient greenhouses in cold climates
5. For space and water heating in cold and temperate climates
6. For low head photovoltaic water pumps for irrigation etc.
7. For solar cookers, refrigeration, and similar domestic appliances under certain conditions (camping outdoors, on ships etc)
8. For sub sixty temperature industrial use, where needed.

As far as we can see now, it will be unrealistic for our nation, in the light of the above facts to put anything more than a moderate amount of interest and money into solar energy. That moderate amount should however be soon forthcoming.

The main thing for us to watch is how we keep up with photo-voltaic technology that is changing every week. If we get into long-term contracts for technology which can become obsolete before the ink dries on the signed contract, we will be in trouble. Western industries will be jealously guarding the more viable technologies, and unless our own research institutions are run with greater efficiency and sincere enthusiasm, we will be at the mercy of the most exploitative and unfavourable terms for transfer of solar or P.V. technology. Here it is a question of more than money. What matters is efficient management of research and the combination of integrity with enthusiasm and creativity.

The west is excited about solar energy - for two reasons. First, there is a "myth of the solar", which they want to believe will redeem them from all their energy, resource depletion and environmental problems. In what seems to be a very dark future, "solar" means the light of hope. So let it be. The myth seems extremely unrealistic. The second reason is slightly sinitier. In a world where market economy capitalism seems to be foundering on the rock of an unreceding recession, the economy as a whole is desperately looking for new markets. The main possibilities now seem to be armaments, information technology and alternative energies. We should beware that we are not taken in by the myth of the solar, which may help mostly the greedy appetites of the profit-makers, while the poor will continue to languish in their misery.

THE NATURE OF NATURE

Metropolitan Paulos Gregorios

(Excerpt from a Manuscript of a Forthcoming Book)

1. The Concept Clarified

The paradox in our present ecological crisis and our conception of nature has been ably brought out by Gordon Kaufman.(1) Nature has been and is being transformed by human cultivation, human technology and human culture. But humanity forms an intrinsic part of this nature, if nature really means the sum total of all beings and processes. Human culture in that perspective is part of nature. The paradox refers to the dilemma between the inclusive and the exclusive view of nature. Some writers like Frederick Elder claim that it is this exclusive view that has led to the ecological crisis, that the Christian tradition is strongly exclusive and is therefore responsible for the crisis, and that only an inclusive view holds out the possibility of survival for humanity.(2)

Once again we seem to be heading for a false set of alternatives on which we can debate furiously without coming to any conclusions. Does the concept of "home" imply only a furnished house, excluding the people who live in it, or is it an inclusive term which takes them into account? The question is ridiculous, for the answer depends entirely on the context in which the word "home" is used. Similarly, even if we accept a view of nature as including humanity, there will still be some contexts in which only the exclusive view will make sense.

It is the very concept of nature itself that is problematic. Human culture and history are certainly part of the ongoing process of reality. The question is, whether nature is the right term to describe the sum total of this reality including humanity, or does the very term amount to a distortion of that reality?

In modern usage, there are several sets of meanings for the word "natural" or "nature".

- a. In ordinary secular language, "natural" is opposed to contrived or artificial, i.e. something which happens or comes into being without human intervention. We could say that the reference here is to the "laws of nature" or the "order of nature", which operate

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(1) "A Problem for Theology: The Concept of Nature", Harvard Theological Review 65 (July 1972), pp. 337-366.

(2) F. Elder, Crisis in Eden: A Religious Study of Man and Environment (Nashville: Abingdon, 1970).

independently of human intervention. This is nature as the realm of unalterable physical laws, nature as given.

- b. In modern Western languages, nature has come to have a related second meaning - the non-human part of creation. When we speak of the beauty of nature, or of caring for nature, we do not mean the order of nature, but rather the visible aspects of the creation around us. But this concept excludes the man-made elements. For example, the city, or at least the complex of buildings, bridges, tunnels and highways made by human beings does not form part of nature; rather it is made up of the elements of earth, air, water and sky, together with plant and animal life.
- c. In Christian theology, nature has two other meanings.
  - i. "Nature" is opposed to "history" and "culture", which are the realm of human action. Protestant theology since the 19th century has tended to emphasize the action of God in history as the central revelation, while usually underplaying his visible activity in nature. The concept of natural revelation has seemed dangerous, since it may justify the knowledge of God in other religions.
  - ii. This Protestant distinction between "natural revelation" and "special" or "historical" revelation has its predecessor in the medieval Roman Catholic distinction, still current, between nature and grace, or between the natural and the supernatural. Grace is God's special and direct action, while nature is given, and has its own laws. Grace can counteract, supplement or overcome nature; it comes from outside or from above nature, and hence is qualified as supernatural.
- d. Underlying all the above meanings of the word "nature" is another: the given structure or constitution of a person or thing. It is not in the nature of a cat to fly. The hawk and the wolf are by nature cruel. Here the reference is both to the given behaviour pattern and the expected character of an entity.

We shall have occasion to refer later to these four meaning-contexts (3), but it will be useful to analyze here the assumptions behind them.

First, the various usages of the word reveal very important metaphysical assumptions. Would it not be correct to say that the Western classical world-view has a more sophisticated three-storey universe than the much lampooned ancient three-tier structure of hell, earth and heaven? At the lowest level of this new three-storey structure is nature as an order with its own given constitution, for both the whole and its parts. On the

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(3) For a fuller discussion of the meanings of the word, see R.G. Collingwood, The Idea of Nature (New York: Oxford, 1945) or C.F. von Weizsäcker, The History of Nature (Chicago: University of Chicago Press, 1959), or in a briefer framework, Kaufman, op. cit.

top level is the realm of the special actions of God, to which terms like revelation, grace and the supernatural refer. Let us call this total structure nature-culture-grace. Under culture, we would include not only history as economic, social and political action, but also science and technology.

The modern ecological debate seems to be concerned with what the second tier does to the first. The new sin, condemned in strong language like "earth-rape" and "terricide", is what we as a human race have done and are doing to "nature". Civilization is attacked not only as a flight from nature but as a brutal and unfeeling assault on it. No overt reference is made to the realm of grace, though demands for a theology of nature or for an ecological theology are often heard.

## 2. Nature in the Bible

We need now to clarify the concept of "nature" from a theological perspective. The Hebrew tradition is often accused of having de-sacralized nature and thereby paved the way for its pillage by humanity. But it is a striking fact that that tradition has no word at all for what we call nature. An examination of the Greek Concordance for the Old Testament (4) confirms that the Greek word for nature, physis, occurs only in the later books produced outside Palestinian Judaism in the diaspora living under Greek influence, i.e. in the Book of Wisdom and in the III and IV Maccabees. These books are regarded as apocrypha by Protestants and others, and do not even appear in the Protestant Old Testament, which follows the canon of Palestinian Judaism.

In other words, it could be said that the concept of "nature" is totally alien to the Hebrew tradition as such. Those who have too easily credited the Old Testament doctrine of creation with making it possible for Western civilization to know and control nature (a totally indefensible claim, in any case) should note that the Hebrews had no notion of something "out there" which they were to set about "desacralizing" and then dominating. The command of Yahweh in the book of Genesis was certainly not "to dominate nature", but only to "be fruitful and multiply, and fill the earth and master it, and have rule over the fish of the sea and over the birds of the air and over every living thing that moves on the earth" (Gen. 1:28). Mastering the earth and all life on it need not mean mastering "nature" as a whole, which is a much wider concept.(5)

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(4) Hatch and Redpath, Concordance to the Septuagint (Oxford, Clarendon Press, 1897) gives the following instances: Wisdom 7:20, 13:1, 19:20, III Maccabees 3:29, IV Maccabees 1:20, 5:7,8,25, 13:27, 15:13,25, and 16:3.

(5) It should be remembered not only that the Old Testament has no word for nature (inclusive or exclusive), but that it has no word for what we call the "universe". The closest it comes to this is "heaven and earth". The word olam, which many writers view as an Old Testament concept for the universe, does not occur very frequently. In 99 per cent of the cases, it is used to mean "forever", "everlastingly", rather than the "world". The closest equivalent to an inclusive sense of nature in the Hebrew Scriptures is tebel - the inhabited or "hominized" earth -, parallel to the Greek oikumene.

This is to say that in the Old Testament tradition, nature is not conceived of as an entity to be dominated. In most instances, even in the apocrypha, the Greek word physis is not used to mean nature in the sense of the non-human part of creation, or as the whole of creation. It is worth quoting as an example IV Maccabees 5:5-8. The book is an apologetic tract glorifying the defence of Judaism against the encroachment of Hellenic culture. The context of the passage is the cruel though courteous demand of the tyrant Antiochus Epiphanes to the venerable Jewish high priest Eleazar, that the latter save himself from torture by eating swine's flesh, which is forbidden for him by the law of Moses.

And Antiochus, looking on him (i.e. Eleazar) said,  
'Before I allow the tortures to begin for you, o venerable man, I would give you this counsel, that you should eat of the flesh of the swine and save your life; for I respect your age and your grey hairs, although to have worn them so long a time and still to cling to the Jewish religion, makes me think you no philosopher. For most excellent is the meat of this animal, which Nature has graciously bestowed upon us, and why should you abominate it? Truly it is folly not to enjoy innocent pleasures, and it is wrong to reject Nature's favours ...'(6)

Clearly it is not the Hebrew who says that nature gave us the pig. Only someone with a Greek education could make this statement. Eleazar's reply contains the word "nature", but he uses it in the sense that God has compassion on the weakness of human nature. Even in this pseudo-pigraphical work, composed under the influence of Greek culture, the Hebrew uses the word "nature" only to denote the God-given constitution of humanity, not the non-human part of creation. In all the other instances where physis is used in the Greek Old Testament it has this same meaning.

The New Testament, also produced under heavy Greek influence, still makes but sparing use of the concept of nature, and only in the classical sense of the God-given nature of an entity. St. James 3:7 and II St. Peter 1:4 are clear instances of this, St. Paul also uses the word physis with this meaning. He speaks, for example, of the "natural branches" (τῶν κατὰ φύσιν κλάδων) as opposed to branches grafted on (Rom. 11:21,24), or of the Gentiles, not having the law, by their very nature (φύσει) doing the things of the law (Rom. 2:14). For St. Paul "by nature" could mean "by birth", as when he speaks of "you who are by nature Jews" (Gal. 2:15). But the basic meaning is that of "constitutive nature", as, for example, in the reference to the service of those who by nature (φύσει) are not gods (Gal. 4:8). In fact, St. Paul even thinks that "nature" itself (ἡ φύσις αὐτῆς) teaches us that it is not very laudable for men to wear long hair (I Cor. 11:14), though very pious Greek and Slavonic monks and many not-so-pious moderns defy this teaching. The reference in Ephesians 2:3 to those who are "by nature children of wrath" is a bit more difficult to unravel, for if nature is what is given by God, it is not easy to see how people can be destined to his wrath by the very fact of their origin. But nowhere in the New Testament does the word "nature" refer to the whole of creation or to its non-human aspect. That, it seems, is a Hellenic legacy in Western Christian thought.

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(6) IV Maccabees 5:5-8, Eng. tr. R.H. Charles, The Apocrypha and Pseudepigrapha of the Old Testament (Oxford, 1913), Vol. II, p. 672.



## Nature - an Indo-Hellenic Concept

Though the concept of nature itself is basically Aristotelian in its early Greek provenance, among the Stoics it received a currency and value not given it by Aristotle. Nature is the Stoic equivalent of the soul of the world, the pneuma that animates it, the seminal logos entirely immanent in the world. Aristotle had not used the word "nature" in quite that sense; for him the cosmos was animated (en-souled) by and had within it the principle of movement. (7) Thus, for both Aristotle and the Stoics, nature itself was a God-substitute. They used the terms synonymously (8), but for an immanent, self-animating principle in the universe - not for the whole of creation.

The key concept used by the Stoics - the idea of the anima mundi, world-soul, - is much more ancient among the Greeks than are Plato and Aristotle, both of whom also employ it. It is likely to play a large part in our own thinking in the near future, for ours is also a God-less world forced to concede that its own existence and processes need some explanation. As the technological crisis deepens, we will need more and more vitalist interpretations of the universe. Bergson, Whitehead and Teilhard may come back into greater currency, because all three are essentially vitalists operating with a concept very similar to that of the world-soul.

The idea of the world-soul has affinities with Hindu thought also, though the precise concept of a lokatma or prapanchatma (world-soul or cosmic soul) is hard to find in the rich Hindu tradition. The idea of the Ultimate Self or paramatma in the Upanishads, however, is not far from the notion of a world-soul, nor is the idea of the Inner Self (of the world) or antaratman to which the Katha Upanishad refers (9), and which it identifies with the human soul itself:

The Inner Self of all things, the One Controller  
Who makes his one form manifold -  
The wise who perceive Him as standing in oneself,  
They and no others, have eternal happiness. (10)

In fact, all the Upanishads seem to use this concept of the world-soul, always, however, identifying it with the Ultimate Soul of God and the personal soul of the finite individual. It is usually conceived in relation to a transcendent Brahman, until we come to the Samkhya system of Hinduism, which is basically non-theistic or atheistic.

Even the Gita, which belongs to a later period than the Upanishads, maintains this clear tradition of a transcendent Universal Self immanent in the universe as its soul. In the great self-manifestation of the

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(7) ὁ δ' οὐρανὸς ἔμψυχος καὶ ἔχει κινήσεως ἀρχήν

de Caelo, B 2, 285 a 29-30;

See also de gen. anim. B 6, 744 b 16-17;

de Caelo Bs, 288 a 2.

(8) ὁ δὲ θεὸς καὶ ἡ φύσις οὐδέν μᾶτην ποιοῦσιν  
was a common dictum to which Aristotle refers in de Caelo.

(9) Katha V:9-12. Engl. Tr. Radhakrishnan and Moore (eds.), A Source-Book in Indian Philosophy (Bombay: Princeton & Oxford University Press, 1957).

(10) Katha V:12.

Ultimate Soul through Krishna to Arjuna, the latter saw "the splendour of that exalted Being" as "if the light of a thousand suns blazed forth all at once in the sky",

There the Pandava (Arjuna) beheld the whole universe,  
with its manifold divisions gathered together in one,  
in the body of the God of Gods.(11)

This concept of the universe as the body of God received central importance in the Hindu tradition with Ramanuja (11th century), and even in Madhva (1197-1276) the organic understanding of the world is still fully dependent on a transcendent God.

A non-transcendent system, parallel to that of the Stoics among the Greeks, occurs in the fully orthodox Hindu system of Samkhya, which is now drawing the attention of many Westerners. The Samkhya system is also noted for its theory of organic evolution, though this is stated only as a rudimentary insight and not as scientific theory. Even more noteworthy in the Samkhya system is the reduction of all categories to two basic entities: person (purusha) and nature (prakṛti). This corresponds to the basic dualism of all empirical knowledge between knowing subject and known object. Prakṛti or nature is a force, not a static being, having within it various grades or levels of qualities, gunas, constituting a progression. These qualities in their interaction produce the world-manifold. But the highest level of evolution of prakṛti takes place only when purusha - the conscious person - excites it and leads it on to its own progressive unfolding.

This school of Hinduism, which flourished around the seventh century B.C., is much older than Plato, Aristotle and the Stoics. Unfortunately the earliest Samkhya writings to which we have access date only from the third century A.D. (12) Dismissing openly and completely the concept of God or Isvara, the Samkhya philosophy makes nature or prakṛti the producer of this world, through the manifold combination of the various constituent gunas.

Thus we see that "nature" is essentially an Indo-Hellenic concept, especially in the sense of an impersonal entity confronting man. In both the Hindu and the Hellenic tradition, "nature" in this sense becomes a necessary concept, particularly in systems that do not attribute the existence of the universe to the activity of the One God. Greek paganism was basically atheistic. Their gods were in most cases only exalted human heroes or personified cosmic powers. The concept of nature functioned as an originating and normative principle, in the absence of the notion of a God who created and sustained the cosmos. The same is true of Hinduism. It is only in the atheistic system of Samkhya that "nature" in the sense of the non-human part of the universe comes to play a central role.

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(11) Radhakrishnan and Moore (eds.), op.cit., p. 139.

(12) The Samkhyakarika of Isvarakrishna, ed. and tr. by S.S. Suryanarayana Sastri (Madras, 1935). See also Source-Book, op. cit., pp.424-452.

It is therefore not surprising that the concept of nature as the non-human part of the universe became prominent in the Western tradition only in its post-renaissance, secularist phase, when the centrality of God began to give place to anthropocentrism. Goethe, Wordsworth and Shelley belong essentially to this phase, though none of them was openly atheistic. For Goethe, converse with nature was a way of perceiving the Urphänomen in it, but he was angry with the technological culture which did not know the right kind of converse to have.

In this sense, there is a usual dialectical ambiguity in the present revolt against technology and in the preference for direct, unitive, reverent perception of and communion with nature. Both the scientific-technological and the romantic-unitive approaches to "nature", as the counterpart and companion of humanity, hide the basic truncation inherent in that artificial construct of reality which belongs to the classical Western Christian tradition, i.e. Grace-Man-Nature. The first aspect becomes almost non-operative in the confrontation between humanity and nature in post-renaissance Western culture, particularly in the Enlightenment. This idea should be developed further; we simply note here that nature as the non-human part of creation plays a more central role in human perception and poetry when the first aspect - God's grace - becomes recessive.

### 3. Nature in the Writings of the Fathers of the Church

The Fathers of the Christian Church, true to their Greek genius, make free use of the concept of nature.(13) When, for example, Origen speaks of the unbegotten nature of God (τὴν ἀγέννητον τοῦ θεοῦ φύσιν)(14) or of the "super-substantial bread" being con-natural to rational creatures (15), and when St. Gregory of Nyssa refers to God as by nature incomprehensible (16) they are using the word with its meaning of constitutive nature, and we shall make but scant reference to these. The Fathers do make frequent use of the term physis in this sense; Mark the Hermit capped off the discussion by distinguishing between what is according to nature (κατὰ φύσιν) and what is above nature or super-natural (παρα φύσιν)(17).

We are concerned here with the Fathers' reflection on nature in that other sense of the word: the whole of creation, sometimes including humanity, sometimes not. But in this connection we should turn from the word physis, or nature, to the words ktisis or ta panta, both of which mean the whole of creation. The Fathers have a strong sense of the laws constituting the nature of all things, but in general they do not call the creation "nature". There are, however, some exceptions to this. For example, the whole creation is referred to as physis in Tatian.(18)

- (13) It is possible to give here only a sampling of the Patristic literature on the subject of nature, and the furious debates about Christ's nature which led to the unfortunate and unproductive schism of the Church in the fifth and sixth centuries will be almost completely omitted.
- (14) Contra Celsum 4:38 PG 11:1089B.
- (15) de Oratione 27 PG 11:513A.
- (16) e.g. Life of Moses PG 44:376D.
- (17) See Opusculum 2:83 PG 65:1104A τρεῖς εἰσι νοητοὶ τόποι, εἰς οὓς ὁ νοῦς ἐκ μεταβολῆς εἰσέρχεται κατὰ φύσιν, παρὰ φύσιν, ὑπὲρ φύσιν
- (18) Oratio 21, PG 6:853B.

In later Greek writings, such as the anathemas of the Council of Constantinople in 543, the universe is called the "whole corporate nature" (πᾶσαν τὴν σωματικὴν φύσιν) (19). But more often than not, when the Fathers speak about creation, they use ἡ πᾶσα κτίσις, the whole of creation, or simply τὰ πάντα, "the all", everything that is.

It is clear in St. Gregory of Nyssa, who laid the foundations for later Christian reflection on the subject, that the basic distinction for Patristic literature is not between humanity and the non-human part of creation, but between "He who truly is" (ὁ ὄντως ὢν) and "the things which merely exist" (τὰ πάντα). The two do not share the same mode of being, and to apply verbs like "is" or "exist" in the same sense to both God and the creation seems to Gregory to be disastrous.

This is important, if rather obvious. The Fathers were never able to keep their terminology sufficiently clear, even when they were aware of the distinction between the being of God and the existence of creation. They applied the word ousia or "being" to both. St. Basil and St. Gregory his younger brother, both spoke of physis (nature) or ousia (being) as parallel entities (20), and John of Damascus in the eighth century systematize the parallelism. (21)

Valentinus Apollinaristes in the fourth century actually identified physis and ousia. (22) Eusebius of Caesarea (fourth century) held that each reality had an intelligible and a sensible aspect, and that physis refers to the intelligible and non-corporeal, while ousia refers to the particular existence which is seen in change and decay as a corporeal entity. (23) He was, however, philosophically unsophisticated, for when the Christian writers refer to the ousia of God, they do not mean a corporeal entity subject to change and decay. Gregory of Nyssa, only a few years later, gave a more defensible definition of nature: "nature" or physis was that in which the existence of being was comprehended. (24) But here again he was not referring to the ousia of God, since he held this to be incomprehensible. St. Maximus the Confessor (sixth century) went the same way in asserting that in Patristic writings physis and ousia are similar and have common features in meaning. (25)

Late in the seventh century the concept of physis took on more precision as the identifiable qualities of a class of persons or things, while ousia referred to simple existence. John of Damascus said that some non-Christian philosophers made a distinction between physis and ousia. For them ousia meant "simply being" (ἀπλῶς εἶναι), while physis referred to the "mode of being" (τρόπος εἶναι) which made possible the classification of beings into species and genera. (26)

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(19) See anathema 6 in A. Hahn (ed.), Bibliothek der Symbole und Glaubensregeln der Alten Kirche, second ed. by L. Hahn (Breslau: Verlag von E. Morgenstern, 1877).

(20) St. Basil: Adv. Eunomium Bk I:12ff. PG 29:540C-541C;  
St. Gregory: Contra Eunomium 8. Jaeger (ed.), Vol. II: p. 202/29ff. PG 45:800B.

(21) de Fide Orthodoxa 3:4 PG 94:997A.

(22) φύσις...καὶ οὐσία ταυτόν ἐστίν...καὶ πάντες..διὰ τῆς ἀληθινῆς πίστεως ὁμολογεῖται τοῦτο γινώσκουσιν"  
Capita Apologiae PG 86:1957A (Physis and ousia are the same, and all who confess the true faith know this.)

(23) Praeparatio Evangelica II:9 (E.H. Cifford (ed.), Oxford, 1903), p. 524A PG 21:868D.

(24) de anima et resurrect PG 46:53C.

Thus the word ousia, which in some instances is applied to the unique mode of being of God, was sometimes used to mean simple existence. Moreover, the Fathers do not mean by "nature" the reality that surrounds us and can be known through our senses, but the constitutive and identifiable qualities of each separate type of being.

#### 4. He Who Truly Is and Things Which Merely Exist

Greek pagan philosophy had already used τὸ πᾶν , "the whole", to refer to the universe; (27) τὰ πάντα , "all things", emphasizing its diversity (rather than the singular which stresses unity), was rarely used. (28) However, with the fourth-century Greek Christian Fathers, the plural came to be preferred. On the one hand, the Fathers were reluctant to ascribe total unity to a universe which participated in the sin of humankind, and, on the other, they wanted to reserve the singular for Him Who Truly Is (ὁ ὢντως ὢν).

The relation between τὰ πάντα the diverse universe, and ὁ ὢντως ὢν, He Who Truly Is, in patristic writing seems much more sophisticated and defensible than many/humanity-nature relationship by dealing only with these two categories alone does not stand up to profound philosophical testing. Plato had already used ὁ ὢντως ὢν for true existence (29) as contrasted with the passing, changing, shadowy being of the particular existents. Athenagoras of Athens, one of the early Christian apologists, had referred to God as "that which truly is", τὸ ὢντως ὢν - neuter), as single in nature (monophas) and as pouring forth the good from it, as the very truth. (30) Clement of Alexandria (+ before 215) also frequently used this expression for the being of God to denote that He alone has a true and fully dependable being. This coincides with the Hebrew tradition's insistence on God as "He Who is and Who will be what He wills to be".

In contrast with this concept stands τὰ πάντα, the changing being of all that has been created. It is this great insight, and not the "de-sacralizing of nature", which stands at the heart of the Judaeo-Christian tradition. God's being is sui generis; it is without beginning and without end, it is neither spatial nor temporal. In other words, it is exactly the opposite of created being, which had a beginning and which must end; which exists in space and moves from beginning to end in time. Created being is inseparable from change; it is now subject to evil and therefore will inevitably disintegrate and die. Created being which has overcome evil must continue to change, moving towards that perfect good which is the being of the Creator. Since we cannot undertake an exhaustive study of the relation between God and creation - one of the central insights of the Judaeo-Christian tradition - we shall centre our study on one writer,

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- (27) Liddell and Scott cites: Empedocles: Frag. 13; Pythagoras accdg. to Aristotle: de Caelo: 268aII; Plato: Timaeus 28c, 30b etc.; Aeschylus: Prometheus Vincetus: 275, 456 etc.; Placita Philosophorum: 2:1,7.
- (28) Liddell and Scott cites only one instance, i.e. in Idomeneus Historicus: Eu: 415.
- (29) Phaedrus 247c, e. Plato speaks here of the true being which is without colour, form or palpability. Republic 597d: 1-3 is also about the only true being of God.
- (30) Athenagoras, Legatio Pro Christianis 23, PG 6:944B.

St. Gregory of Nyssa, making some reference to others. But first we must briefly look at the Western tradition.

In conclusion, certain preliminary observations can be made on the basis of the foregoing:

- a. The concept of nature as the non-human part of the universe is primarily Indo-Hellenic in origin and becomes particularly prominent in an alienated society, i.e. one which has lost its direct sense of dependence on and derivation from God.
- b. If the reaction against the evils of a technocratic civilization leads merely to a romantic reaffirmation of and reunion with nature, it cannot be salutary, for even the classical Western Christian tradition insists on the centrality of the third element - God.
- c. In the Judaeo-Christian tradition, there was no such process as a desacralization of nature, because in it not only was the concept of nature as sub-human creation unknown, but also nature was never "divine", since it was not God, but only a created reality.

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